



Animal Bites and Zoonoses

MAJ Lea Dickson, DVM, Diplomate ACVP
Veterinary Services Program (VSP)
Veterinary Pathology
WRAIR

*Acknowledgement: COL James F Cummings, MD
Director, Global Emerging Infectious Surveillance (GEIS)*

Disclosures

- Views are my own opinion, and not those of the US Army or WRAIR
- I have no financial relationships with any of the products / companies discussed

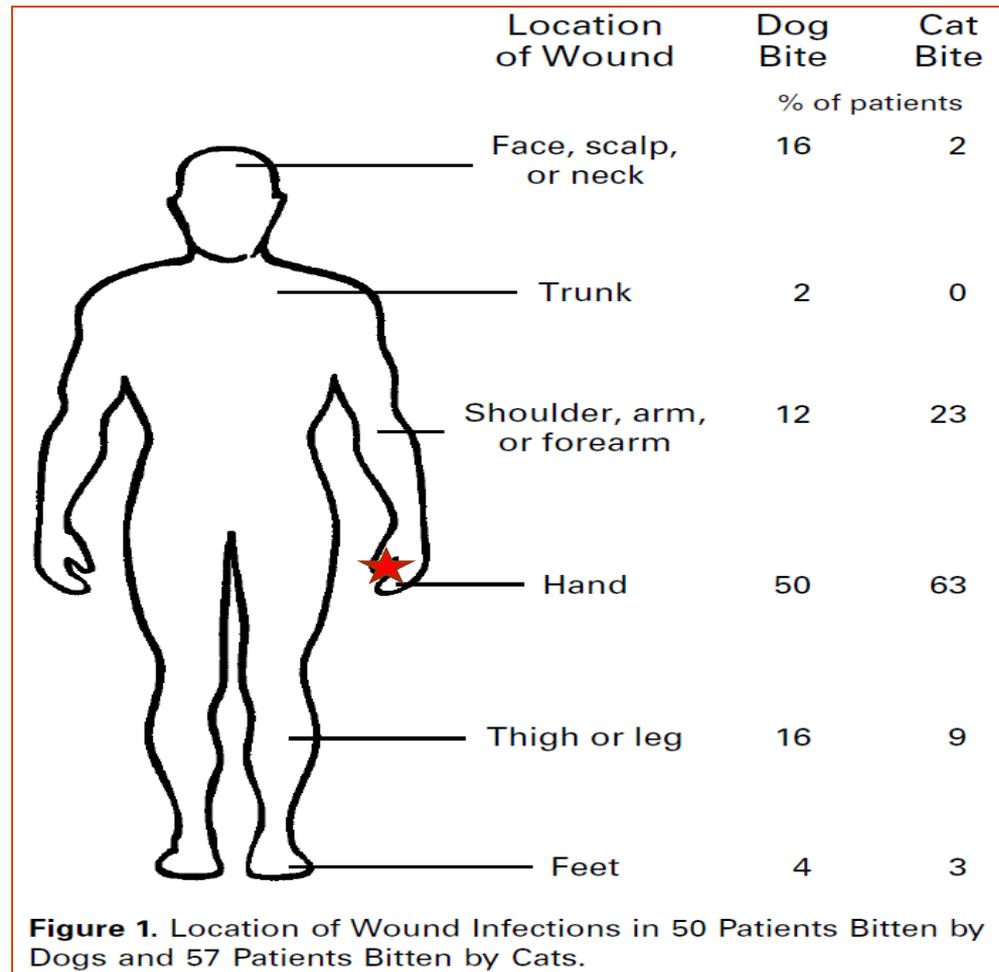
Animal Bites and Zoonoses: *Outline*

- Dogs
- Cats
- Monkeys
- Snakes
- Other sources of bites & zoonoses

Animal Bites and Zoonoses: Overview

- Bite Infections: *mix of anaerobes and aerobes from the patient's skin and the animal's oral cavity*
- Zoonosis: *(1) disease that is transmissible from animals to human (2) spread by aerosols, feces, urine, insects, and direct contact*
- Zooanthroponosis: *Reverse zoonotic disease transmission*

Animal Bites and Zoonoses: *Overview*



Animal Bites and Zoonoses: Overview

Table – Common bacteria in animal bites*

Dog bites

Pasturella (both *canis* and *multocida*)

Streptococci

Staphylococci

Neisseria

Corynebacterium

Anaerobes

Cat bites

Pasturella
(primarily *multocida*)

Streptococci

Staphylococci

Moraxella

Corynebacterium

Neisseria

*Listed in order of most common to least common.

Animal Bites and Zoonoses: Overview

TABLE 1. Number and percentage of animal bites by demographic and military characteristics, active and reserve components, U.S. Armed Forces, 2001-2010

	Outside theater		In theater		Total	
	No.	%	No.	%	No.	%
Total	19,879	100.0	643	100.0	20,522	100.0
Sex						
Female	4,233	21.3	86	13.4	4,319	21.0
Male	15,646	78.7	557	86.6	16,203	79.0
Age Group						
17-19	650	3.3	18	2.8	668	3.3
20-29	10,995	55.3	422	65.6	11,417	55.6
30-39	5,485	27.6	140	21.8	5,625	27.4
40+	2,749	13.8	63	9.8	2,812	13.7
Race-ethnicity						
White, non-Hispanic	14,964	75.3	486	75.6	15,450	75.3
Black, non-Hispanic	1,671	8.4	51	7.9	1,722	8.4
Hispanic	1,702	8.6	63	9.8	1,765	8.6
Asian/Pacific Islander	627	3.2	21	3.3	648	3.2
American Indian/Alaskan Native	315	1.6	7	1.1	322	1.6
Other	600	3.0	15	2.3	615	3.0
Service						
Army	7,714	38.8	399	62.1	8,113	39.5
Navy	3,965	19.9	125	19.4	4,090	19.9
Air Force	5,722	28.8	87	13.5	5,809	28.3
Marine Corps	2,021	10.2	32	5.0	2,053	10.0
Coast Guard	457	2.3	0	0.0	457	2.2
Rank						
Junior enlisted (E1-E4)	7,412	37.3	292	45.4	7,704	37.5
Senior enlisted (E5-E9)	9,100	45.8	282	43.9	9,382	45.7
Junior officers (O1-O3 [W1-W3])	2,007	10.1	55	8.6	2,062	10.0
Senior officers (O4-O10 [W4-W5])	1,360	6.8	14	2.2	1,374	6.7

Animal Bites and Zoonoses: *Dog*



Animal Bites and Zoonoses: *Dog*

- Tens of millions worldwide
- 4.5 million people are bitten each year (United States)
 - Dogs more likely to bite: male (6.2x), chained (2.8x), intact (2.6x)
 - Pit bulls, Rottweiler's, Presa canarios, Cane corsos, Mastiffs, Dogo argentinos, fila brasileiro, Sharpeis, boxers
 - Highest amongst 5-9 y/o boys
 - 885,000 seek medical treatment
 - 30,000 reconstructive surgery
 - ~10-20 fatalities

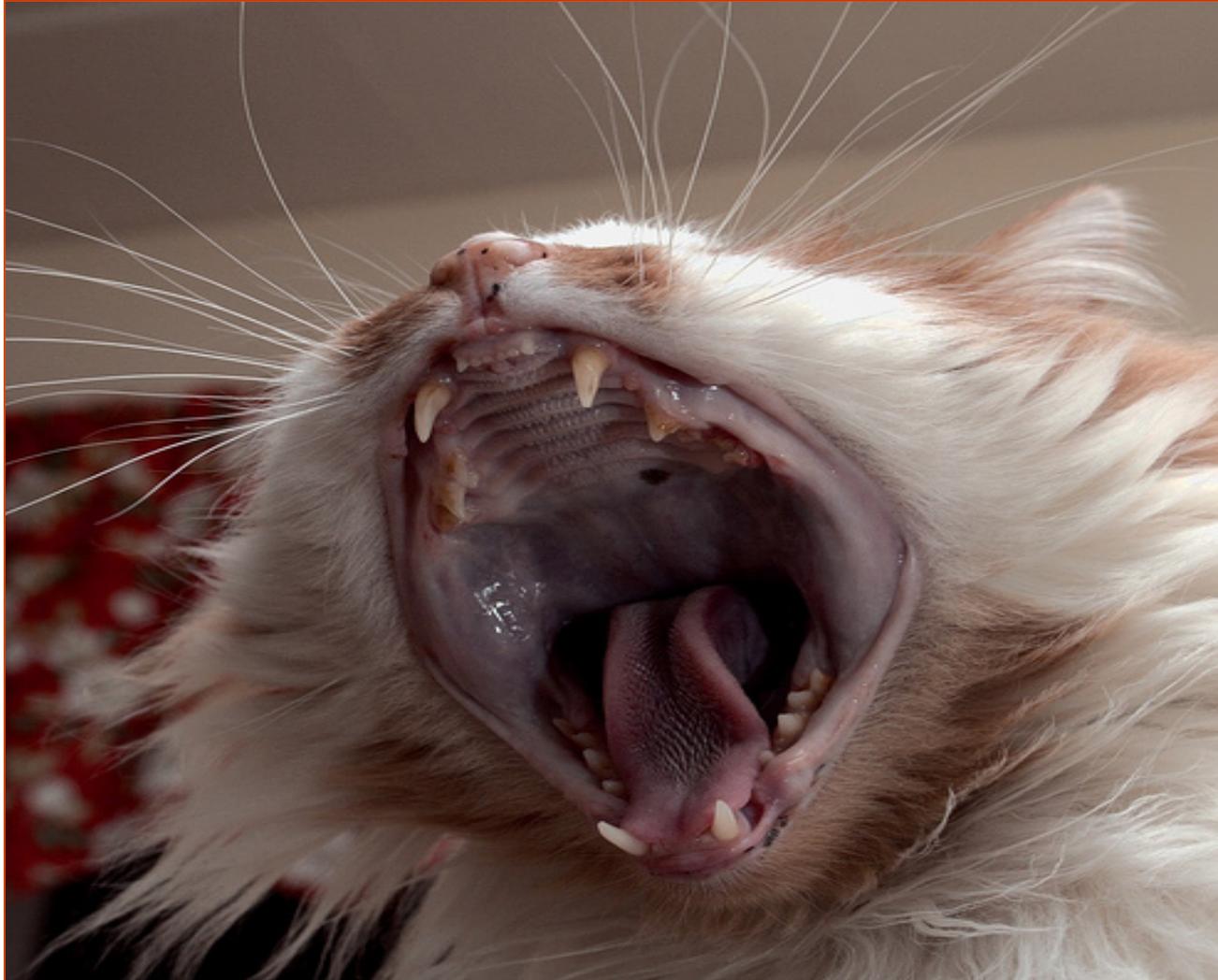
Animal Bites and Zoonoses: *Dog*



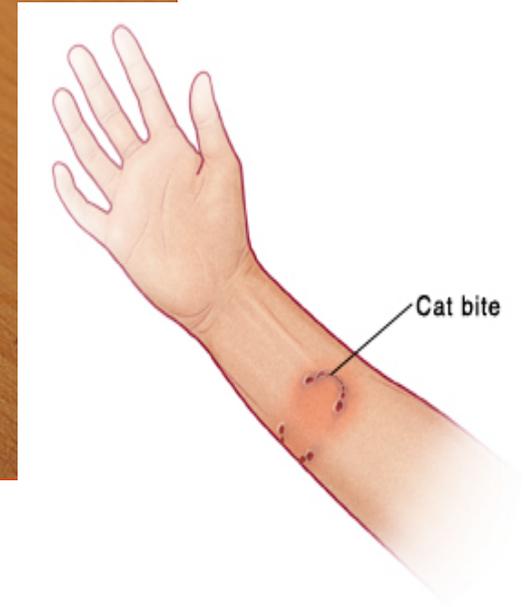
Animal Bites and Zoonoses: Dog

- Bacteria:
 - **Mixture** of dog oral flora & bacteria on the skin victim
 - Only 2-10% get infected
 - Aerobic
 - *Pasteurella spp, Streptococcus spp, Staphylococcus spp, Neisseria*
 - Anaerobic
 - *Fusobacterium, Bacteriodes, Porphyromonas, Prevotella, Capnocytophaga canimorsus*
- Virus: RABIES
 - Dogs account for 90% of rabies transmission to humans in developing countries

Animal Bites and Zoonoses: *Cat*



Animal Bites and Zoonoses: *Cat*



Animal Bites and Zoonoses: *Cat*

- ~400,000 in the US
- Bacteria:
 - Aerobic
 - *Pasteurella spp*, *Streptococcus spp*, *Staphylococcus spp*, *Neisseria*, *Bartonella henselae*
 - Anaerobic
 - *Fusobacterium*, *Bacteriodes*, *Porphyromonas*, *Prevotella*
 - Bacteria located on the skin of person bitten
- Virus: RABIES

Animal Bites and Zoonoses: Cat

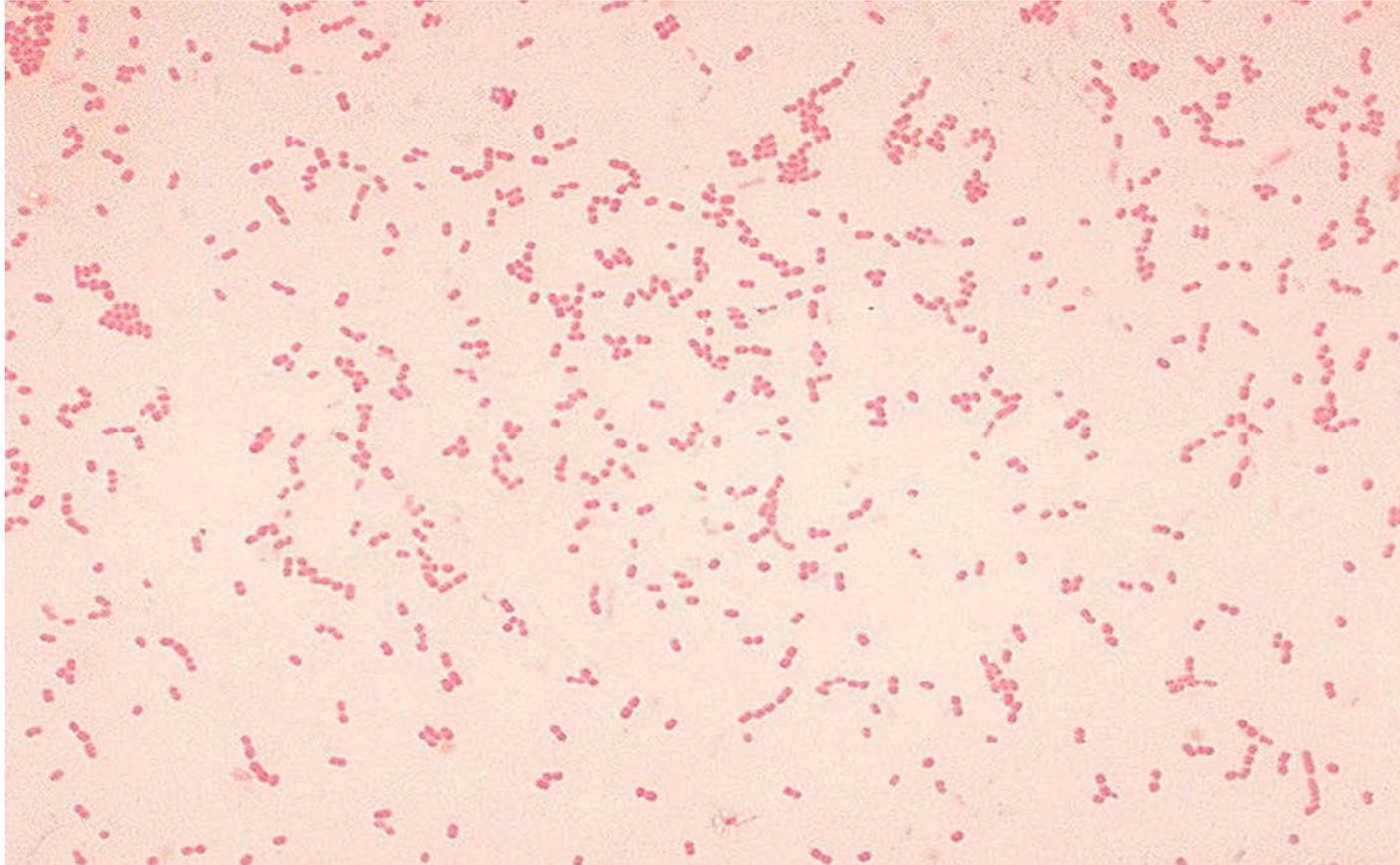
(Pasteurella multocida)

- Small, aerobic gram-negative bacilli
- Present in the **saliva of >90% of cats**; most wounds get infected
- Different species, *Pasteurella canis*, in saliva of 50% dogs, contributes to lower infection rate
- Clinical signs/ lesions:
 - Very rapid development: within 24 hours or as early as three hours after a cat bite
 - **Abscesses**, necrotizing soft tissue infections, **septic arthritis**, and osteomyelitis
 - Pain, swelling, purulent discharge, intense inflammatory response

Animal Bites and Zoonoses: Cat (*Pasteurella multocida*)



Animal Bites and Zoonoses: Cat (*Pasteurella multocida*)



**Gram-negative, non-spore-forming bacilli consistent with
*Pasteurella multocida***

Animal Bites and Zoonoses: *Cat* (*Cat Scratch Fever*)

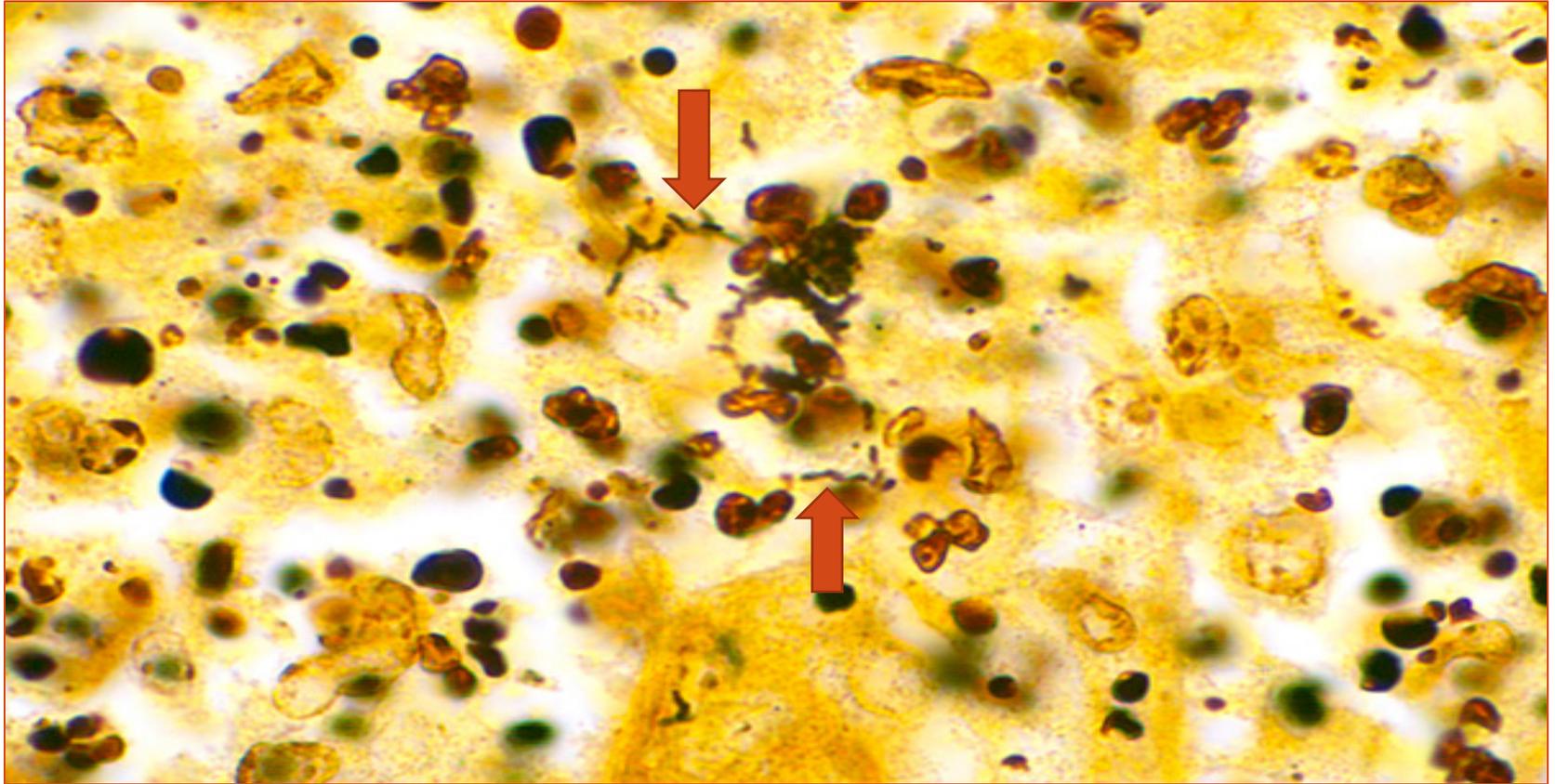
- *Brattonella henselae*; gram-negative, argyrophilic, bacilli.
- **Cats** are the **major reservoir**, but arthropods (fleas) and other animals may also play a role in the pathogenesis.
- Distribution: Worldwide
- Transmission: **bites; scratches; licks**
- Clinical signs/lesions: Single-node / regional **lymphadenopathy; fever; fatigue; muscle/joint pain**; skin eruptions; weight loss; and splenomegaly
- Treatment: **Azithromycin**; penicillin; tetracycline; cephalosporins; aminoglycosides; fluoroquinolones

Animal Bites and Zoonoses: *Cat* (*Cat Scratch Fever*)



Lymph nodes, axillary & retroauricular: Lymphadenopathy

Animal Bites and Zoonoses: *Cat* (*Cat Scratch Fever*)

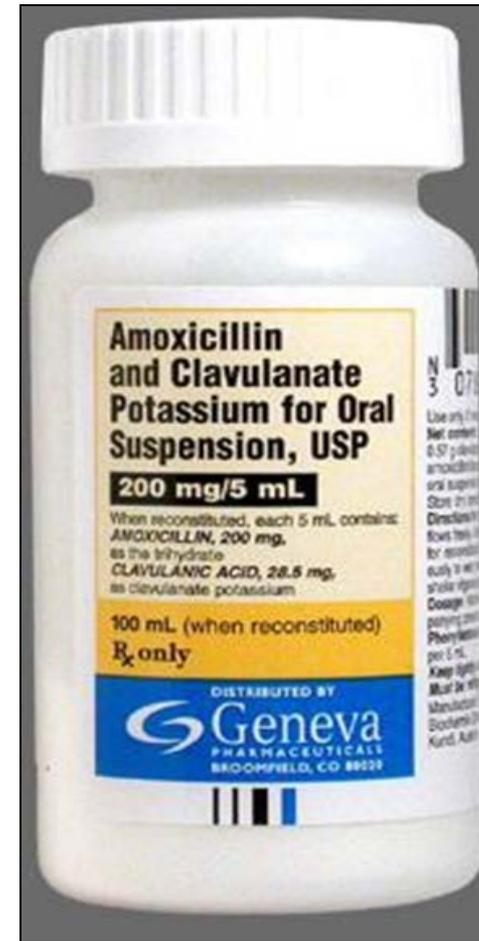


Lymph node: Rare intracellular and extracellular, silver-positive, 2 x 3-5 um bacilli. (blue arrows)

Animal Bites and Zoonoses

Treatment

- Drug of Choice: **Augmentin**
- Cat & human bites, especially punctures, are highest risk
- Susceptibility: *Pasteurella*, *Fusobacterium*, *Capnocytophaga*, *Staph aureus*, *Bacteroides*, *Corynebacteria*, *Eikenella*
- For penicillin allergic:
Cefuroxime, clindamycin, doxycycline, TMP/SMX



Animal Bites & Zoonoses: *NHP*



Beware of Herpes B virus

Animal Bites and Zoonoses: *NHP*

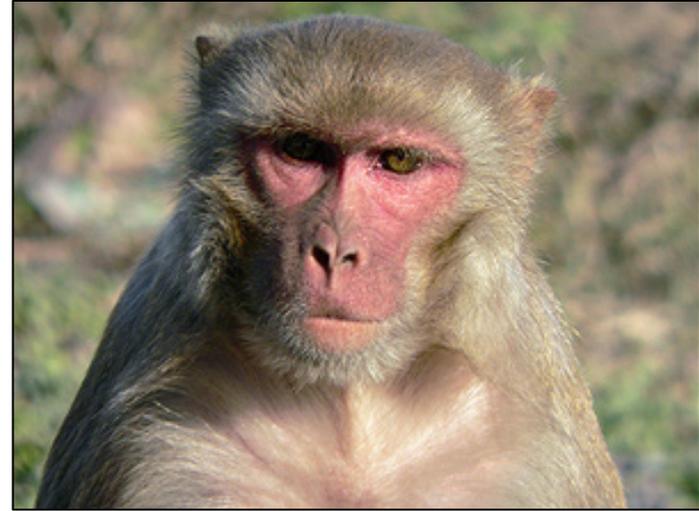
(Herpes B)



NEW WORLD MONKEYS

- Nostrils are far apart and open to the side
- Some species have prehensile tails
- Thumb orientation lies in line with other digits
- Some species have fingernails on big toe
- Live in trees

(Examples: marmosets, tamarins, squirrel monkeys)



OLD WORLD MONKEYS

- Nostrils are closer together and open downward or forward
- Tail is not prehensile
- Thumbs are opposable
- Fingernails and toenails present on digits
- Live mostly on the ground

(Examples: macaques, baboons, African green monkeys)

Animal Bites and Zoonoses: *NHP* (*Herpes B*)

- Herpes B Virus
 - *NOT Hepatitis B (different disease)*
 - Macaquesine (formerly, Cercopethicine) herpes virus 1
 - Distribution: Worldwide
 - Transmission: **rhesus macaques** (via bites/scratches/contact w/tissue fluids)
 - **80 – 90% of adult macaques infected; ASYMPTOMATIC**
 - Virus is shed throughout life in oral, genital and ocular secretions
 - 3 patterns of disease:
 - Vesicular/ulcerative
 - Influenza like illness
 - **Neurologic** with nausea and vomiting
- **Human disease (**encephalitis**) is usually **fatal (80%)** if untreated or results in severe neurologic impairment****

Animal Bites and Zoonoses: *NHP*

Herpes B (Post exposure treatment)

Post exposure treatment:

- Prophylaxis

- Acyclovir: (800 mg po qid) x 2 weeks, if 1 day post exposure

- Valacyclovir: (1g po tid) x 2 weeks

- Clinical signs

- If no CNS/PNS findings: IV Acyclovir

- If **CNS/PNS findings: IV Gancyclovir**

- Additional treatment:

- Antimicrobials

- Tetanus verification/vaccination

- Rabies post exposure prophylaxis (PEP)

Animal Bites and Zoonoses: *NHP* (*Herpes B*)

- **Samples:**
 - Blood sample (5 mls of serum)
 - Swab of wound (in viral medium)

- **Mailing address:**
National B Virus Resource Center

Georgia State University
161 Jesse Hill Jr. Drive
Atlanta, Georgia 30303

-Phone # 404-413-6550

-Fax#: 404-413-6556

-Email: bvirus@gsu.edu

-Website: <http://www2.gsu.edu/~wwwvir/>

 National B Virus Resource Center Viral Immunology Center Georgia State University 161 Jesse Hill Jr. Drive Atlanta, GA 30303		
Please fill out completely and include with shipment. Acrobat writer user can fill out, save, and email the form / Acrobat reader (higher than 5) user can fill out, print, and fax the form.		
1. Institution/Company name: _____		
2. Mailing Address: _____		City: _____ State: _____ Zip: _____
3. Billing Address: _____		City: _____ State: _____ Zip: _____
4. Purchase Order Number: _____		
5. Billing Information		
a) Credit Card: <input type="checkbox"/> Visa <input type="checkbox"/> Mastercard		Card Number: _____ Security code: _____
Expiration Date: _____		Contact Person: _____ Phone: _____
b) other: _____		
6. Testing Requested by: * _____		7. Phone: _____ 8. Emergency Phone: _____
9. Send results to #2 address <input type="checkbox"/> if not use a textbox below		10. Phone: _____ 11. Emergency Phone: _____
12. FAX#: _____		13. Emergency Pager #: _____ 14. email: _____
Special Instructions: _____		
Human Sample Information: Mark tubes clearly.		
15. Name or ID: _____		
16. Test Purpose: _____		
17. Injury Type: _____		
18. Injury Date: _____		19. Injury related Primate's ID: _____
20. Species: _____		
21. Serum? <input type="checkbox"/> Yes <input type="checkbox"/> No		22. Total serum tubes: _____
23. Collection date(s): _____		24. Virology? <input type="checkbox"/> Yes <input type="checkbox"/> No
25. Total virology tubes: _____		26. Collection date: _____
27. Sites: <input type="checkbox"/> Wound <input type="checkbox"/> Buccal <input type="checkbox"/> Right eye <input type="checkbox"/> Left eye <input type="checkbox"/> Biopsy		
Special Instructions: _____		
Primate Sample Information: Mark tubes clearly		
28. Name or ID: _____		
29. Species: _____		
30. Test Purpose: _____		
31. Injury Type: _____		
32. Injury Date: _____		33. Injury related Human's ID: _____
34. Serum? <input type="checkbox"/> Yes <input type="checkbox"/> No		35. Total serum tubes: _____
36. Collection date(s): _____		37. Virology? <input type="checkbox"/> Yes <input type="checkbox"/> No
38. Total virology tubes: _____		39. Collection date: _____
40. Sites: <input type="checkbox"/> Buccal <input type="checkbox"/> Right eye <input type="checkbox"/> Left eye <input type="checkbox"/> Genital <input type="checkbox"/> Lesion		
Special Instructions: _____		
A. If you have any problems or questions regarding sample collections or shipment, please contact our laboratory. B. Please contact our laboratory prior to shipping so we can schedule your samples for testing C. Phone: 404-413-6550 Fax: 404-413-6556 email: bvirus@gsu.edu * Human testing should be requested by a physician.		
FOR BV LABORATORY USE ONLY		
Institution Code: _____ Condition: _____ Case#: _____ Total samples: _____		
Rec'd Date: _____ Priority: _____		Acc.#: _____
Rec'd Time: _____ Tech: _____		Does tube info match Paperwork? <input type="checkbox"/> Yes <input type="checkbox"/> No

Animal Bites and Zoonoses: *NHP*

Herpes B (Cases in Afghanistan)

- 126 animal bite exposures in Afghanistan
- 10 monkey bites
- 5 received appropriate B virus prophylaxis

Monkey Bites among US Military Members, Afghanistan, 2011

Luke E. Mease¹ and Kathryn A. Baker²

Bites from *Macaca mulatta* monkeys, native to Afghanistan, can cause serious infections. To determine risk for US military members in Afghanistan, we reviewed records for September–December 2011. Among 126 animal bites and exposures, 10 were monkey bites. Command emphasis is vital for preventing monkey bites, provider training and bite reporting promote postexposure treatment.

Military members deployed to Afghanistan face many risks; among these are bites from *Macaca mulatta* monkeys and possible subsequent infections. In August 2011, a 24-year-old US Army soldier died of a rabies infection contracted while in eastern Afghanistan. This tragedy highlights the threat that animal bites pose to deployed military members.

During 2001–2010, a total of 643 animal bites among deployed US military members were reported (1). Dogs were implicated in 50% of these bites, but several other animals pose risk as well. Prominent among these is the nonhuman primate *M. mulatta* (rhesus macaque), native to and commonly kept as a pet in Afghanistan (2) (Figure). Risks from *M. mulatta* monkey bites include physical trauma and/or infection with B-virus (Macacine herpesvirus 1), oral bacteria (including *Clostridium tetani*), and rabies virus. Although not well characterized in Afghanistan, the risk for exposure to *M. mulatta* monkeys has been described (3) for researchers (4), tourism workers (5), and US pet owners (6). We examined this risk for US military members deployed to eastern Afghanistan. The work presented herein was reviewed and deemed exempt from internal review board oversight by the Joint Combat Casualty Research Team, the human subjects review board responsible for oversight of human subjects research affecting US military members in Afghanistan.

The Study

Information about all reported animal bites and exposures affecting US military and coalition personnel is collected by preventive medicine officers assigned to

Author affiliation: US Army Combined Joint Task Force–1, Bagram Air Field, Afghanistan

DOI: <http://dx.doi.org/10.3201/eid1810.120419>

Combined Joint Task Force–1 in eastern Afghanistan. We evaluated these records to identify and describe monkey bites and high-risk exposures among US military members serving in eastern Afghanistan during September–December 2011. For this study, eastern Afghanistan refers to North Atlantic Treaty Organization Regional Command East, which covers ≈43,000 square miles (110,000 km²). The US military population in eastern Afghanistan during the study period was ≈23,500 persons. Case information obtained included patient age, sex, rank, branch of military service, animal exposures, and treatment details.

We evaluated the cases for the 5 parameters that comprise appropriate initial treatment according to the literature. The parameters are wound care (appropriate cleansing of the wound) (7), antiviral medications for B-virus (valacyclovir) (8), antimicrobial drugs for oral bacteria (amoxicillin/clavulanic acid or clindamycin plus sulfamethoxazole/trimethoprim) (3), verification of up-to-date tetanus vaccination status or vaccine administration in accordance with Advisory Committee on Immunization Practices guidelines (9), and rabies postexposure prophylaxis (PEP). US military policy advised that rabies PEP should adhere to World Health Organization guidelines (10), which recommend giving human rabies immunoglobulin plus 5 doses of rabies vaccine. In accordance with the same policy, adherence to Advisory Committee on Immunization Practices guidelines for rabies PEP with human rabies immunoglobulin plus 4 doses of rabies vaccine was also acceptable (11).

When appropriate initial treatment was not administered, subsequent follow-up was conducted to ensure that patients received required treatment. Appropriate treatment was accomplished by contacting and coordinating with the responsible provider, the patients, and their commanders.

During the study period, we identified 126 cases of animal bites or serious exposures (involving animal neural tissue or saliva affecting the mucosal surfaces or open wounds of the patient). Among these cases, 10 were cases of monkey bites.

Among the 10 military members who had been bitten by monkeys, age range was 22–44 years (Table); most (7) were <30 years of age, and 8 were male. All were junior enlisted or noncommissioned officers; 8 were members of the Army, and 2 were members of the Air Force (Table).

In terms of treatment, 6 received appropriate wound care and washing, 5 received appropriate B-virus prophylaxis, and 8 received appropriate antimicrobial drugs (Table). In terms of prophylaxis, only 4 were evaluated for

¹Current affiliation: Army Health Clinic, Dugway Proving Ground, Utah, USA.

²Current affiliation: General Leonard Wood Army Community Hospital, Fort Leonard Wood, Missouri, USA.

Animal Bites and Zoonoses: *Snake*

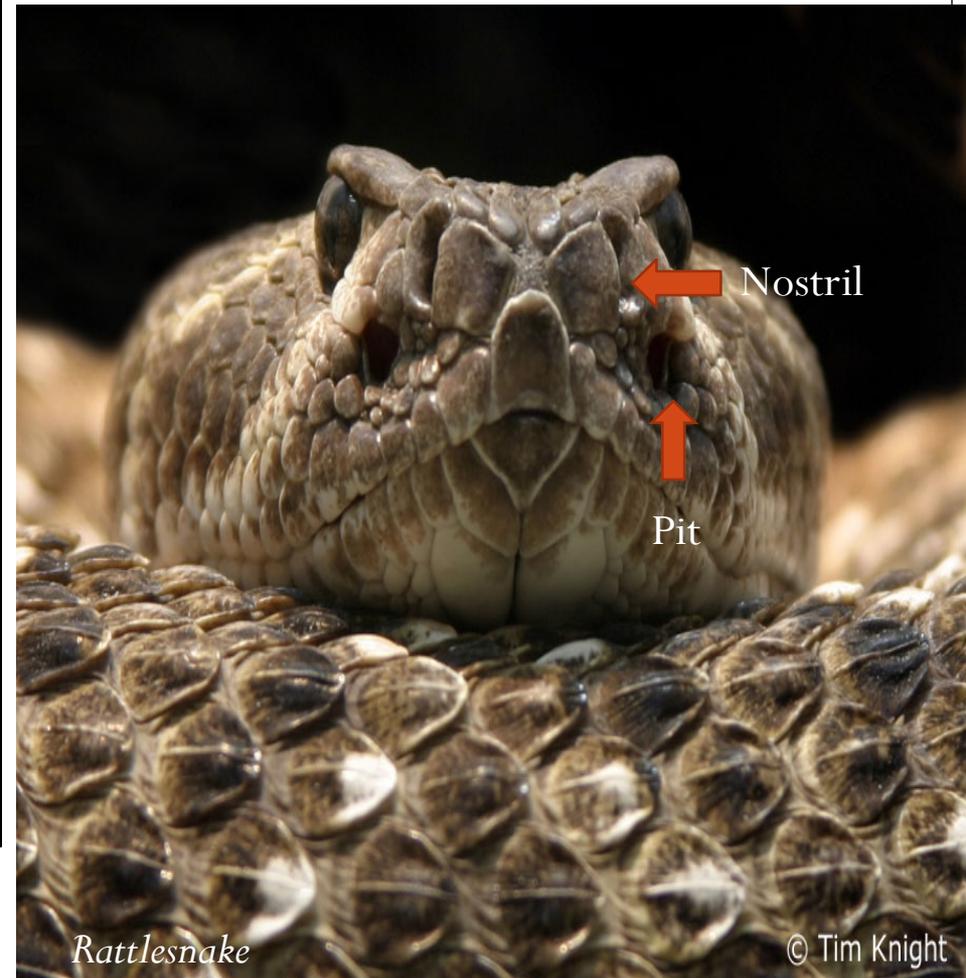
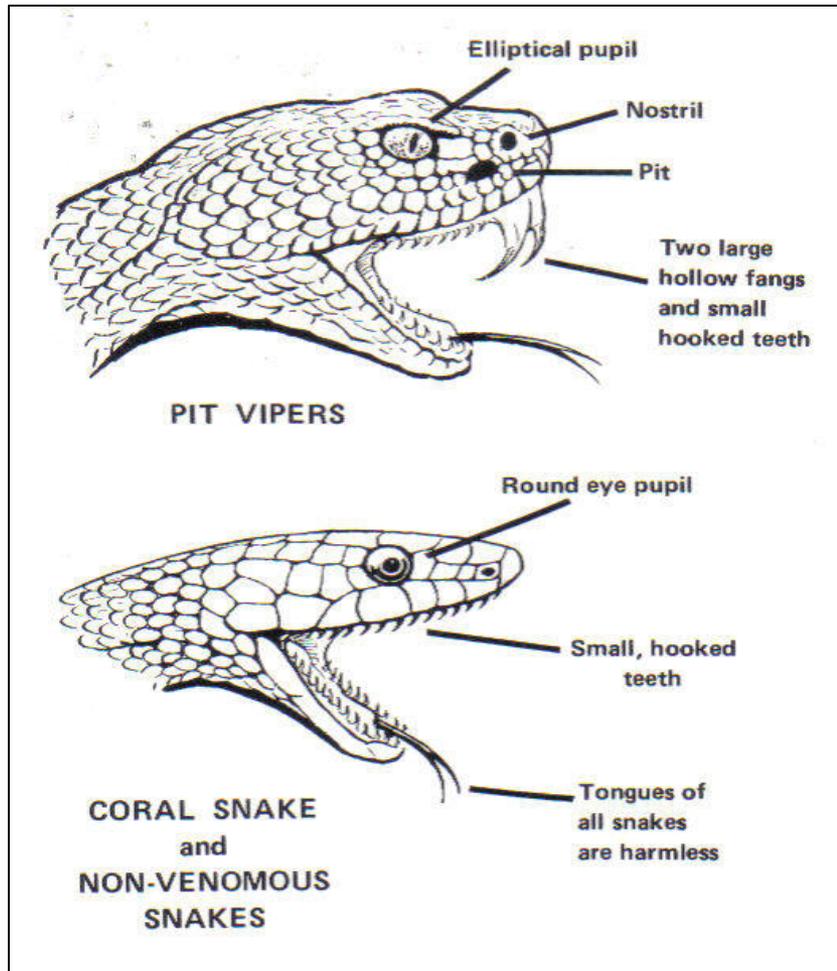


Animal Bites and Zoonoses: *Snake*

- Worldwide: > 5 million people bitten annually (majority in Africa and South-East Asia)
- ~2.4 million envenomation
- 400,000 severe health consequences (i.e.; amputation)
- 94,000-125,000 death annually
- Poisonous snakes (North America): *Rattlesnake, Cottonmouth (water moccasin), Copperhead, and Coral Snakes*

Animal Bites and Zoonoses: Snake

Pit vipers: rattlesnakes; copperheads; water moccasin (cotton mouth)



Animal Bites and Zoonoses: Snake

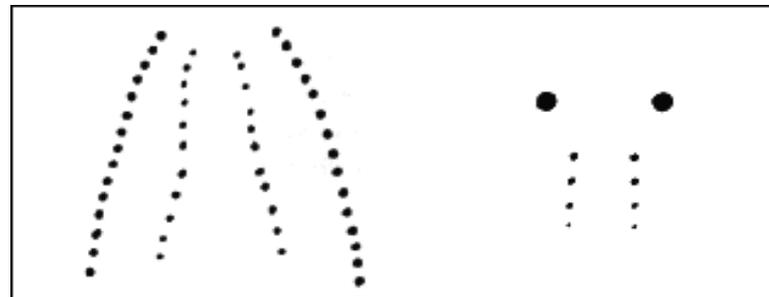
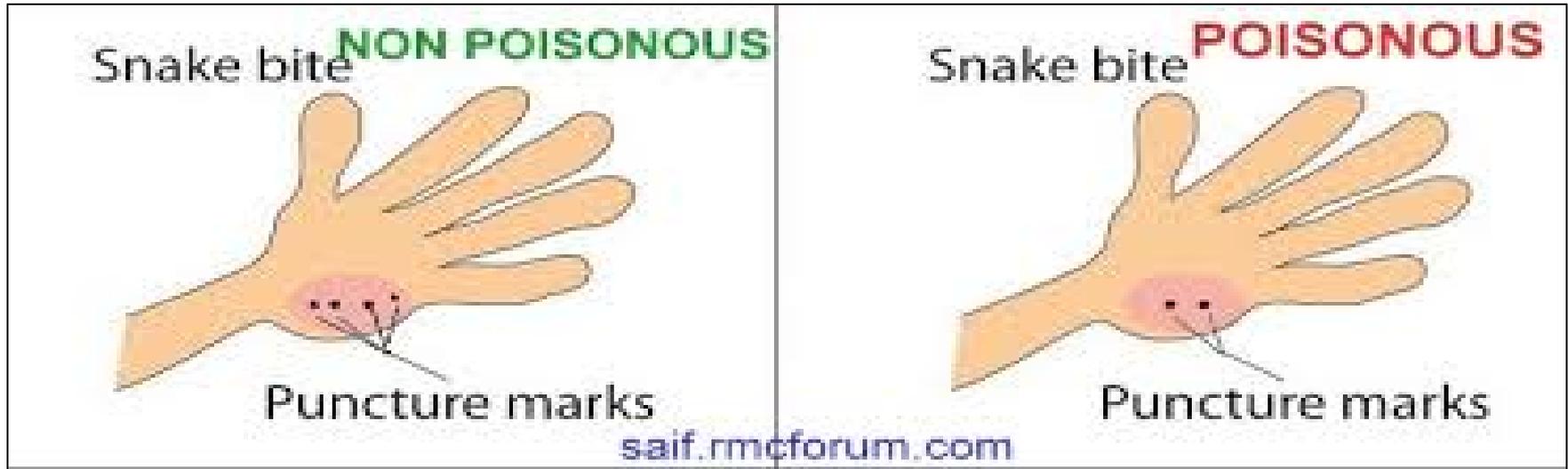
Coral & Non Venomous Snakes:



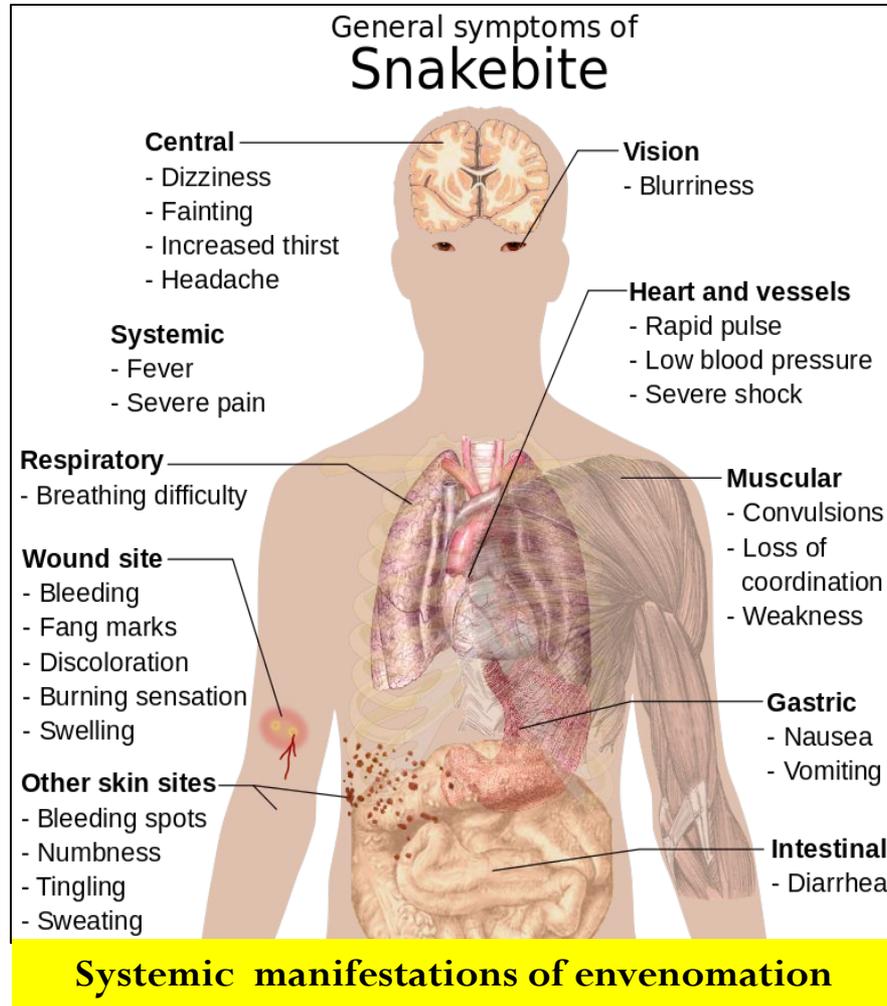
Which snake is poisonous?

Hint: “**Red** on **yellow**, kills a fellow”
“**Red** on black, a friend of Jack”

Animal Bites and Zoonoses: *Snake*



Animal Bites and Zoonoses: Snake



- **Neurotoxins:**

Cytotoxins: causes local tissue damage

Hemotoxins: damages blood vessels/cells

Neurotoxins: affects the nervous system

Cardiotoxins: act directly on the heart

- **History (Hx):**

Time of bite

Description of the snake

Type of field therapy

Underlying medical conditions

Allergy to horse or sheep products

Hx of previous venomous snake bites & therapy

- **Physical examination:**

-Complete physical exam performed; plus baseline measurements of limb circumference proximal & distal to site

-*Pit vipers:* local effects; coagulopathy (specifically, Rattlesnakes); other systemic effects

-*Coral snakes:* primarily neurotoxic effects

Animal Bites and Zoonoses: Snake

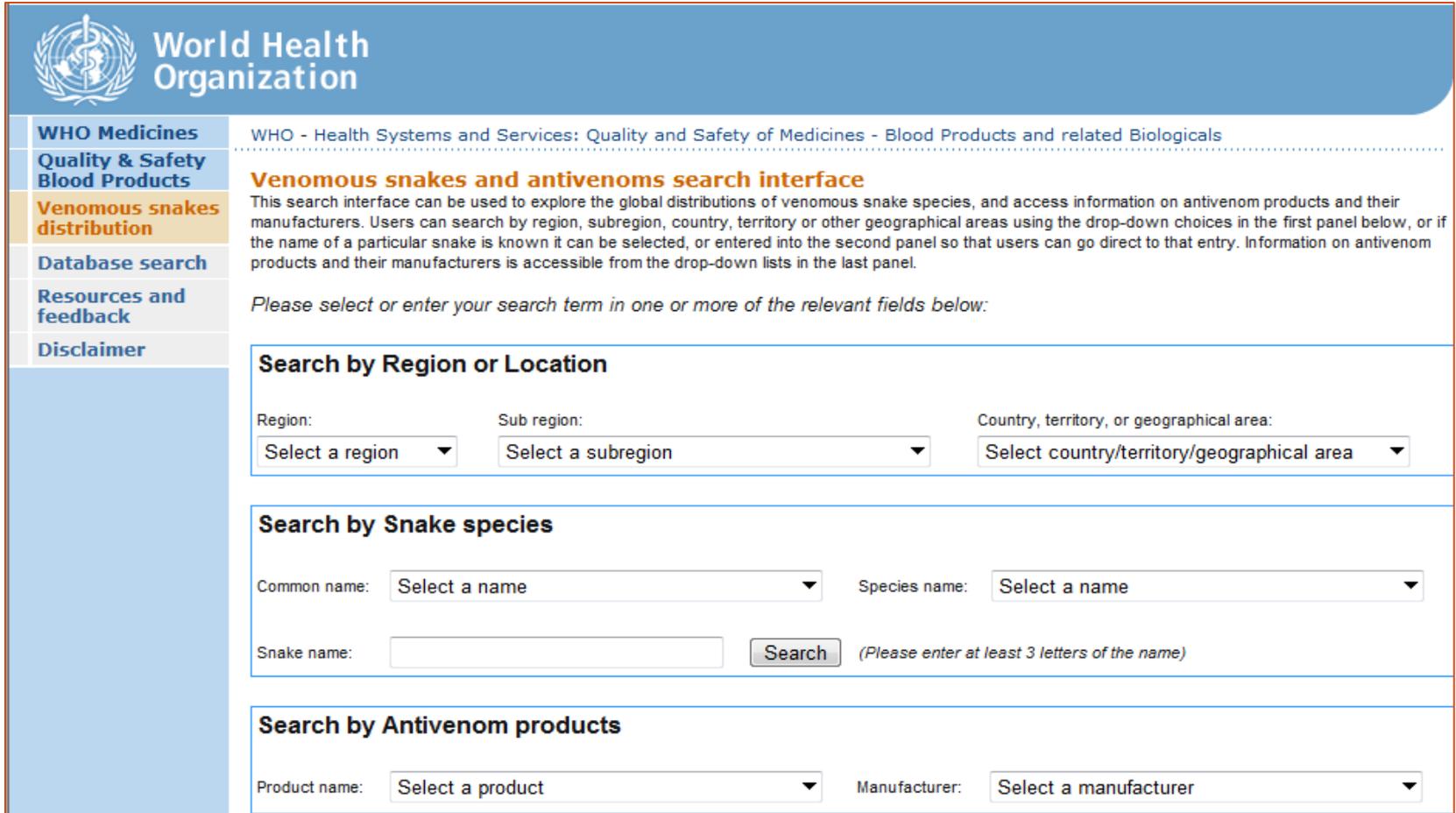


Animal Bites and Zoonoses: Snake

Treatment

- Maintain airway, breathing, and circulation
 - **Circumferential extremity measurements** should be performed on arrival (repeat every 15-20 min)
 - Outline the margins of local edema
 - Bloodwork: *CBC (including platelets); coagulation profile (e.g., PT, APTT, fibrinogen); FDPs, urinalysis, electrolytes, BUN, creatinine*
 - **Moderate-severe envenomation:** *blood typing; cross matching; ECG; chest x-ray*
- ****Monitor patients closely for at least 8 hours (pit viper bites); 12 hours (coral snakes)*****

Animal Bites and Zoonoses: Snake



The image shows a screenshot of the WHO Medicines Quality & Safety Blood Products search interface for venomous snakes and antivenoms. The interface is divided into several sections:

- WHO Medicines Quality & Safety Blood Products**: WHO - Health Systems and Services: Quality and Safety of Medicines - Blood Products and related Biologicals
- Venomous snakes and antivenoms search interface**: This search interface can be used to explore the global distributions of venomous snake species, and access information on antivenom products and their manufacturers. Users can search by region, subregion, country, territory or other geographical areas using the drop-down choices in the first panel below, or if the name of a particular snake is known it can be selected, or entered into the second panel so that users can go direct to that entry. Information on antivenom products and their manufacturers is accessible from the drop-down lists in the last panel.
- Database search**: Please select or enter your search term in one or more of the relevant fields below:
- Search by Region or Location**:
 - Region:
 - Sub region:
 - Country, territory, or geographical area:
- Search by Snake species**:
 - Common name:
 - Species name:
 - Snake name: (Please enter at least 3 letters of the name)
- Search by Antivenom products**:
 - Product name:
 - Manufacturer:

<http://apps.who.int/bloodproducts/snakeantivenoms/database/>

Animal Bites and Zoonoses: *Rodent & Rabbit*



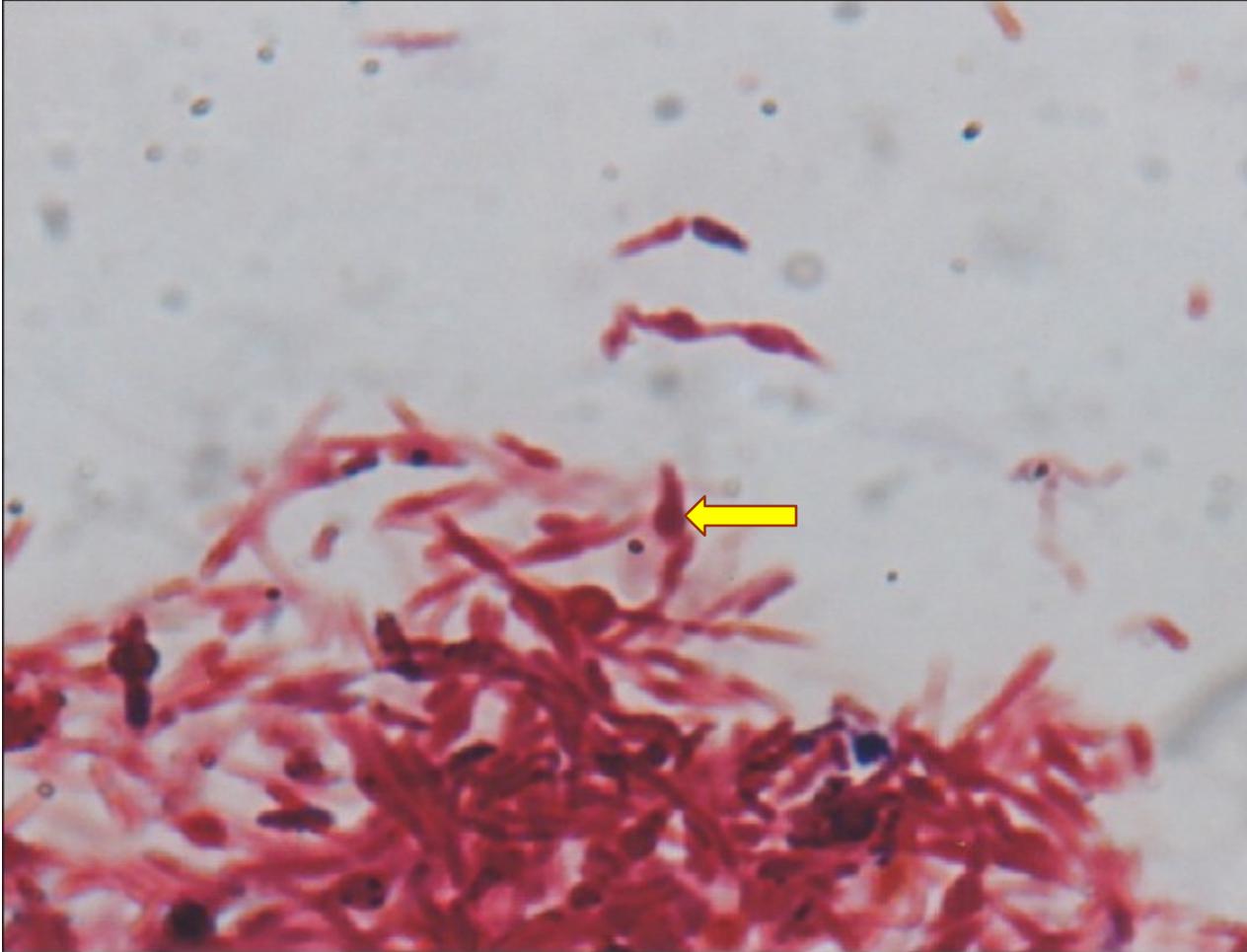
Animal Bites and Zoonoses: Rodents & Rabbits

Case

- 48 y/o male in SE Asia arrives at clinic with fevers and severe myalgias
- He had been slipped a ruffi while at a club, bushwacked when exiting, roughed up, robbed and left in a back alley, awakening in his own filth, shoes, valuables and ID all stolen
- No evidence of sexual assault
- On PE, **animal bite marks around right ankle**
- Faint rash on extremities
- Within 24hrs, **blood cultures positive for pleomorphic gram negative rods**

Animal Bites and Zoonoses:

Case



Gram stain: numerous gram-negative filamentous bacilli with bulbous or sausage-shaped (moniliform) swellings appearing along the filament , resembling a string of beads.

Animal Bites and Zoonoses:

Case: *Rat Bite fever*

- *Spirillum minus* in Asia
- *Streptobacillus moniliformis* in USA
- Transmission: bites; scratches; water/food borne
- Clinical signs/lesions:
 - **Polyarthralgias**; headache; **rash**; vomiting; fever (*Streptobacillary*)
 - Fever; ulcer/swelling @ bite wound; swollen LN; **rash** (*Spirillary*)
 - Nausea; vomiting; pharyngitis: (“*Haverhill Fever*”-unpasteurized milk outbreak)
 - Maculo-papular rash (extremities); vasculitis; **muscle/joint pain** (polyarthritis in approximately 50% of the patients); myocarditis; meningitis; pneumonia
- Treatment:
 - Penicillin, Doxycycline

Animal Bites and Zoonoses:

Case: (*Rat Bite fever*)

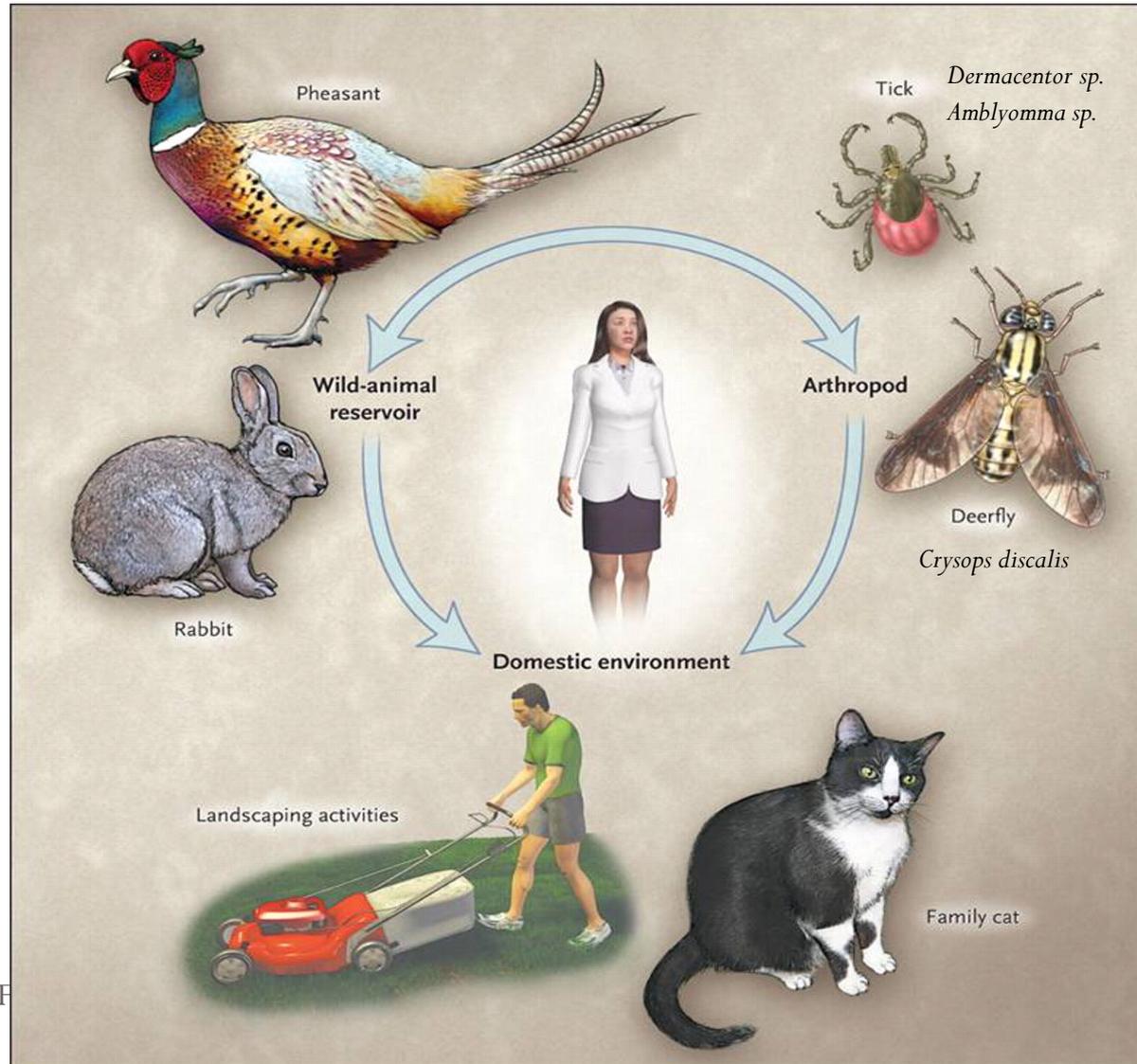


Purpuric spots on buttocks and thighs due to rat-bite fever

Animal Bites and Zoonoses: *Rodent & Rabbit* (*Tularemia*)

- Condition synonyms: “Rabbit fever”; Deer fly fever; Ohare’s disease
- Etiology: *Francisella tularensis*; Gram negative coccobacillus
- Wide distribution: Canada, Mexico, Europe, Russia, Tunisia, Turkey, Israel, Iran, Japan, and China; United States (100-200 cases/annually)
- Transmission: vector bite (tick; deerfly); ingestion; aerosolization; direct contact
- 6 forms:
 - Aerosolization (**pneumonic**)
 - Direct contact/ingestion(**ulceroglandular; oculoglandular; oropharyngeal; glandular; typhoidal**)
- Clinical signs/lesions: variable; dermal ulcerations-**lymphadenitis**
- Treatment:
 - Streptomycin (30 mg/kg qd IM) for 10-14 days
 - Gentamicin (3-5 mg/kg qd IV) for 10-14 days.

Animal Bites and Zoonoses: *Rodent & Rabbit* (Tularemia)



Animal Bites and Zoonoses: *Rodent and Rabbit (Tularemia)*

AN OUTBREAK OF PRIMARY PNEUMONIC TULAREMIA ON MARTHA'S VINEYARD

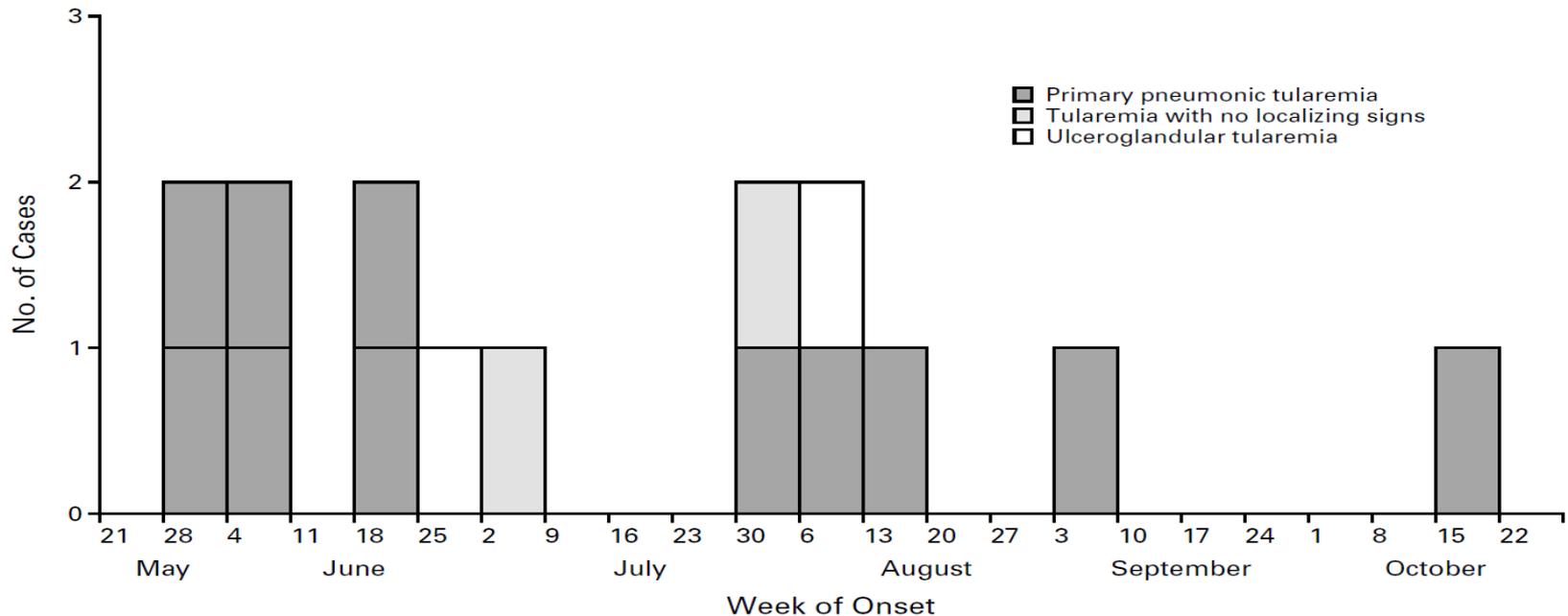
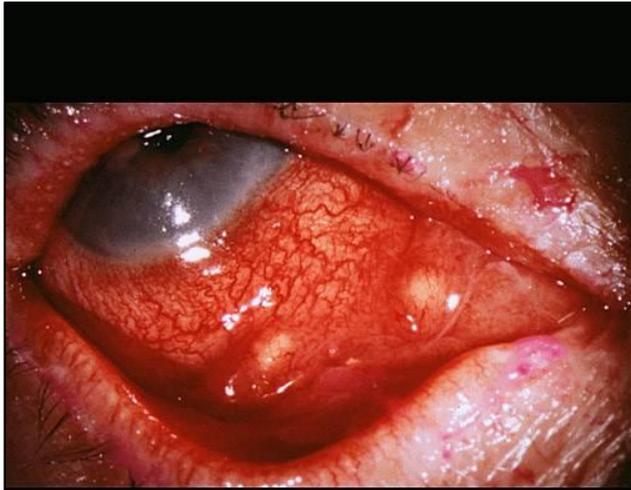
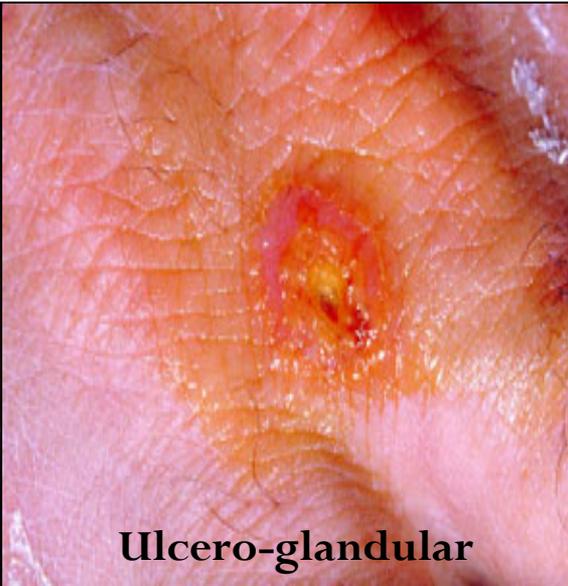


Figure 1. Cases of Primary Pneumonic Tularemia, Tularemia with No Localizing Signs, and Ulceroglandular Tularemia on Martha's Vineyard, May 21 through October 28, 2000, According to the Week of Onset of Illness.

Animal Bites and Zoonoses: *Rodent & Rabbit* (*Tularemia*)



Oculo-glandular



Ulceroglandular



Glandular

Animal Bites and Zoonoses: Fish

(Candira sp.)

<http://animal.discovery.com/videos/weird-true-freaky-fish-attacks-mans-urethra.html>

Animal Bites and Zoonoses: Fish

(*Candira*)

- *Vandellia cirrhosa*; “Toothpick fish”: Parasitic freshwater catfish native to the water of S. America (Bolivia, Brazil, Colombia, Ecuador and Peru)
- Documented case of invasion of a human urethra
- Attracted to UREA
- BLUF: No urinating in the river!!!!



Animal Bites and Zoonoses: Ruminant (Cattle, Sheep & Goat)



Animal Bites and Zoonoses: Ruminant



Skin, lip: Proliferative and papular cheilitis & dermatitis

Animal Bites and Zoonoses: Ruminant (Orf)

- Parapoxvirus; Orf; Soremouth; Contagious Ecthyma
- Worldwide distribution
- Incubation 3-7 days; self limiting
- Transmission: entry of infected exudates (via skin abrasions); commonly occurs during shearing, docking, or slaughtering (wear gloves & wash hands)
- Clinical signs/lesions: small focal papule (dorsum of index finger); common secondary bacterial infections
- Treatment: possible surgical resection; cryotherapy

Animal Bites: Ruminant

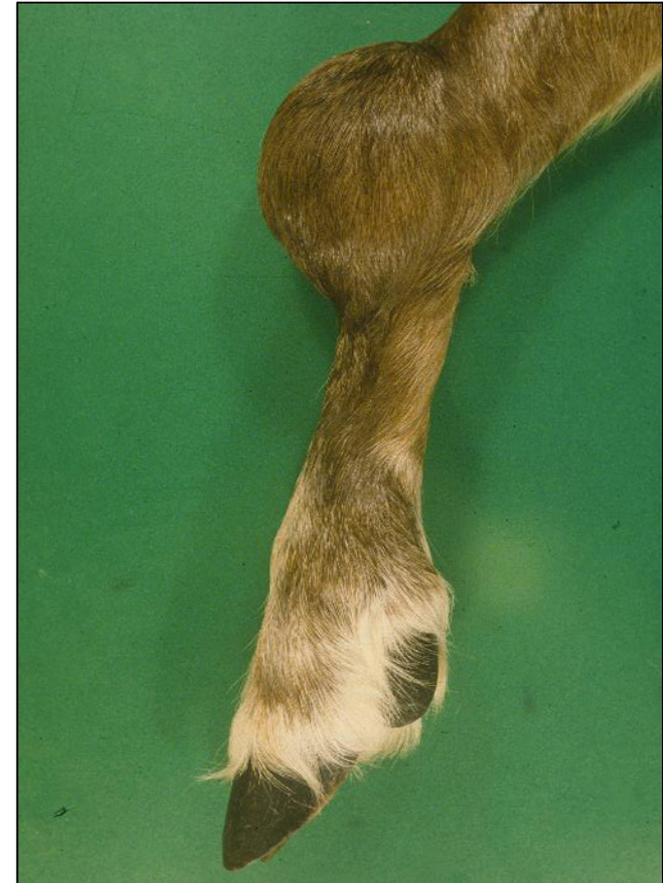
Brucellosis

- Etiology: *Brucella* sp.; gram negative bacilli/coccobacilli
 - B. abortus*: (cattle, bison, elk, caribou)
 - B. melitensis*: (goats, sheep)
 - B. suis*: (swine, wild pigs)
 - B. canis*: (dogs, coyotes)
- Condition synonyms: Undulant fever; Malta fever; Bangs disease
- Transmission: **consumption of raw milk**; direct contact
- Clinical signs/lesions:
 - (acute) fever; sweats; malaise; anorexia; headache; muscle/joint pain; fatigue
 - (chronic) recurrent fevers; **arthritis; swelling of the testicles & scrotum**
- Treatment: Doxycycline & rifampin (minimum of 6-8 weeks)

Animal Bites and Zoonoses: Ruminant (*Brucellosis*)



Animal Bites and Zoonoses: Ruminant (Brucellosis)

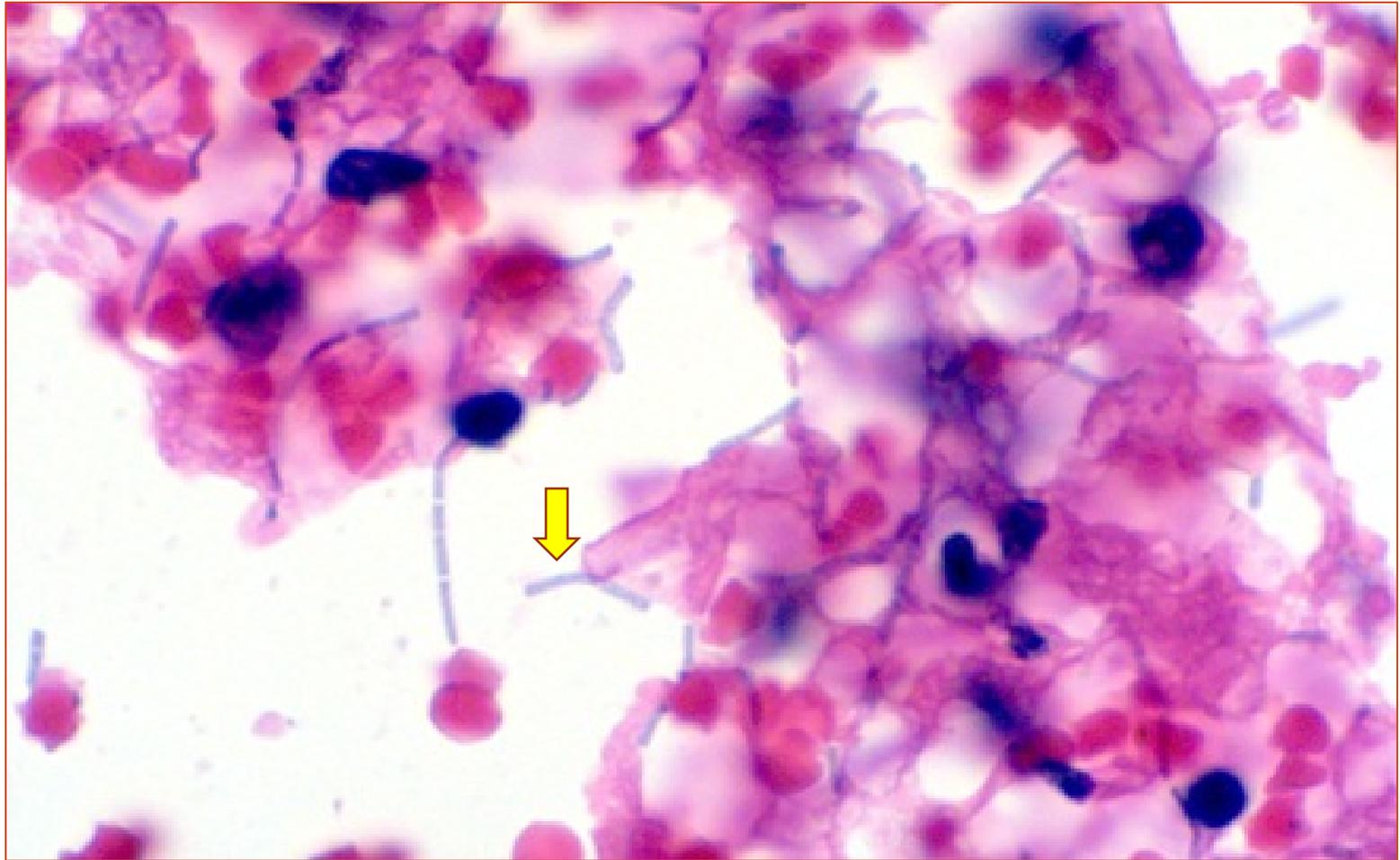


Carpus (caribou): The carpal bursa is markedly swollen and fluctuant.
Brucella suis

Animal Bites and Zoonoses: Ruminant (*Anthrax*)

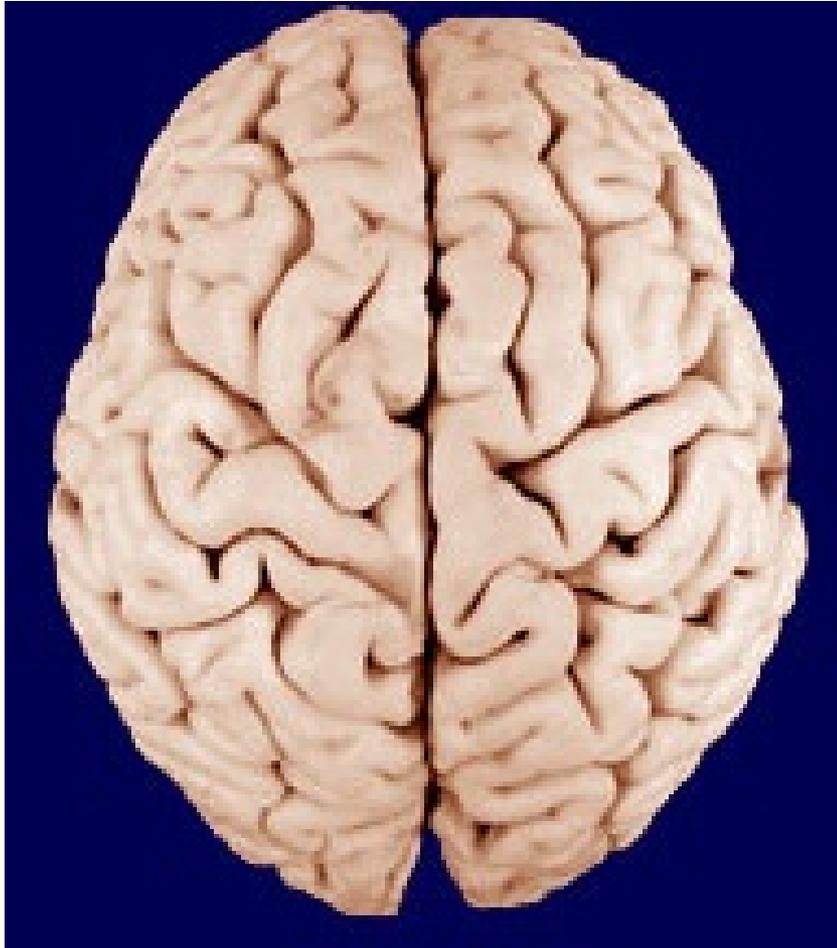
- *Bacillus anthracis*; gram positive rod
- Wide distribution: Central/South America; sub-Saharan Africa; Asia; south & eastern Europe; Caribbean
- Transmission: consumption, inhalation, or direct contact with infected animals/animal products
- Types: cutaneous (**most common/least dangerous**); inhalation (**most dangerous**); gastrointestinal; injection
- **Hallmark lesions**: (1) moderate to marked pleural effusion (2) pericardial effusion (3) **meningitis**

Animal Bites and Zoonoses: Ruminant (Anthrax)

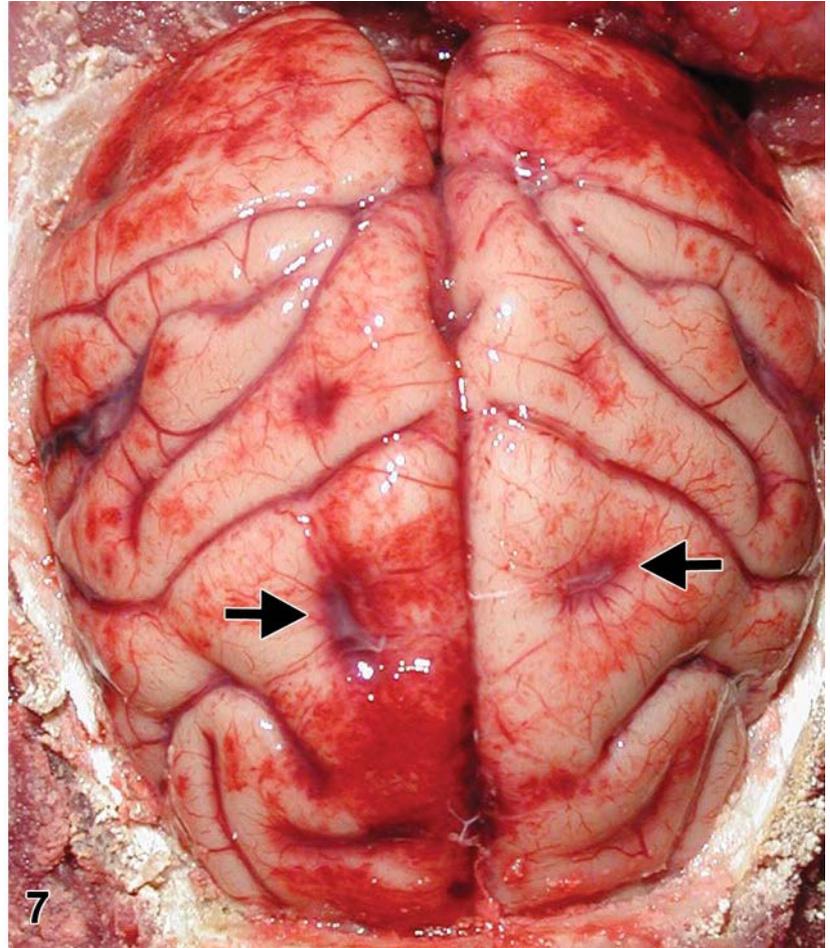


Lung (bull): There are abundant large bacilli that occur individually or in short chains of 2 to 6 organisms.

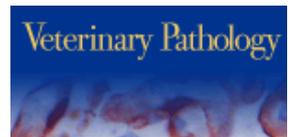
Animal Bites and Zoonoses: Ruminant (Anthrax)



Normal brain (fixed)



7
Cerebrum: Multifocal cerebral hemorrhage



Animal Bites and Zoonoses: Ruminant *(Anthrax)*



Skin: Focal necroulcerative dermatitis (black eschar)

Animal Bites and Zoonoses: (Mystery Case)



Animal Bites and Zoonoses: (Mystery Case)

- 52 y/o male from Baltimore w/hand injury arrives 12 hours (post injury) to the ER.
- Presents with a swollen, red, painful fist.
- Initial treatment: wound cleaned; antibiotic (cephalexin) administration; cold compress; and discharged.
- Patient returns to ER 5 days later w/tachycardia, hypotension, fever, and confusion .
- At ER, the attending clinician observed:
 - purulent exudate through a small injury on the dorsal metacarpus
 - increase of local temperature
 - edema on the forearm
 - exacerbated pain at finger mobilization
 - no crepitation was detected

Animal Bites and Zoonoses: (Mystery Case)



Animal Bites and Zoonoses: Human (*Eikenella corrodens*)

- Anaerobic small *gram-negative bacilli*
- Common in *human oral flora*
- Treatment: Penicillin; Doxycycline; Fluoroquinolones
- Resistance: Clindamycin, Erythromycin

Animal Bites and Zoonoses: Human (**Eikenella corrodens**)

The rest of the story.....

- Anti-tetanus immunization was performed, and patient transferred to surgery room
- Pressure in dorsal compartment was (20mm Hg)
- Purulent material (about 120 ml) drained from pre-retinacular space
- Administered: 1 g ampicillin-sulbactam (IV q 6 hours)

Animal Bites and Zoonoses: Human (*Eikenella corrodens*)



Animal Bites and Zoonoses: *Summary*

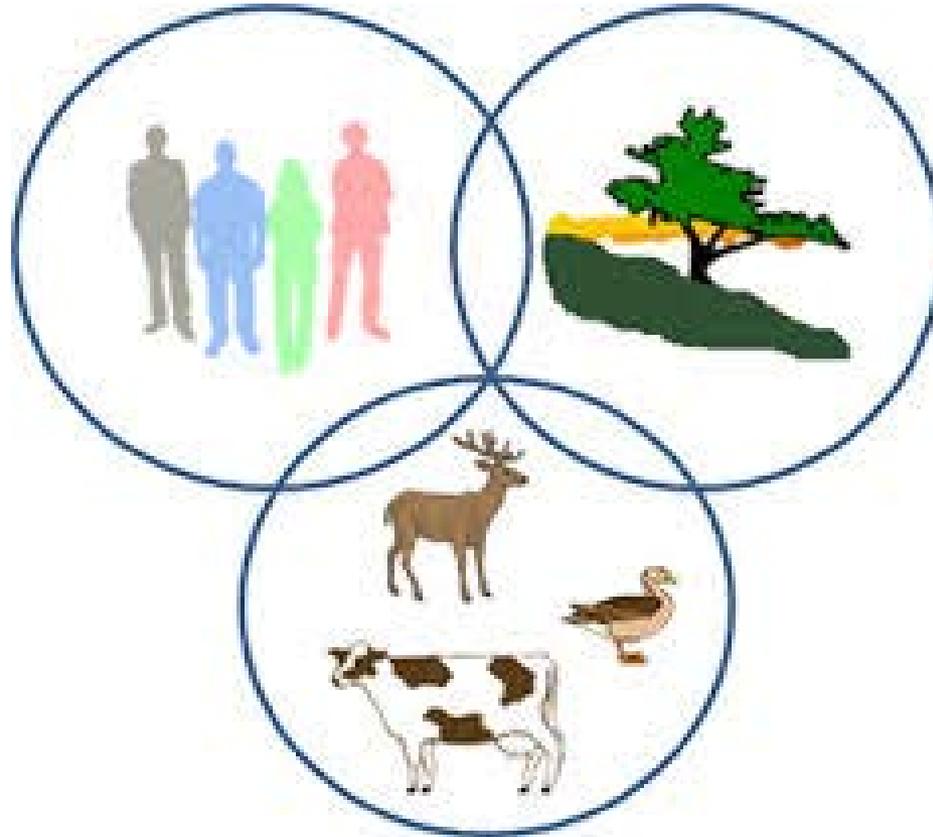
Treatment (“ODD BITES”)

- **O**: open treatment
- **D**: debridement
- **D**: drugs (antibiotics)

- **B**: blood work
- **I**: irrigation
- **T**: tetanus prophylaxis
- **E**: exploration (including x-ray)
- **S**: swab (cultures)

Animal Bites and Zoonoses: *Summary*

One Health



Recognizing that human health, animal health, and ecosystem health are inextricably linked. -- <http://www.onehealthinitiative.com/>

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This Lecture...Bites?

- Feedback appreciated

Contact:

MAJ Lea Dickson

301-319-7440

Email: leonora.j.dickson.mil@mail.mil