



# ZOONOSIS

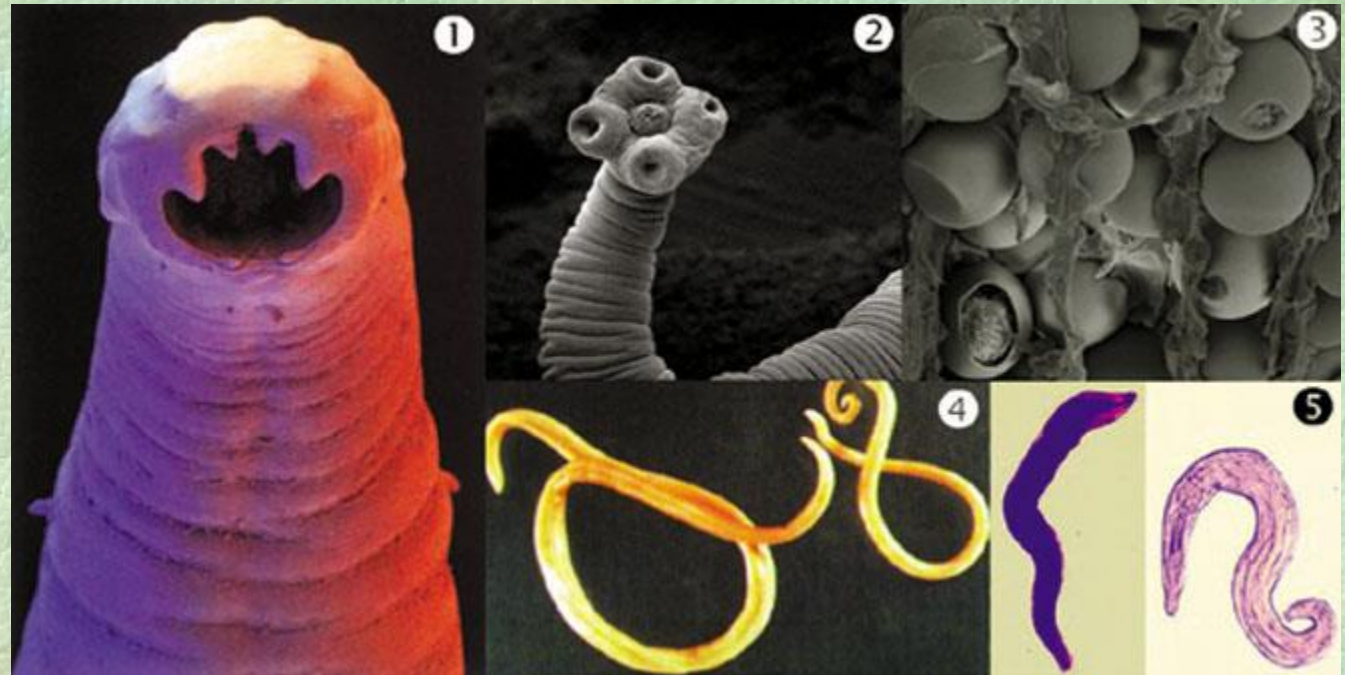
**What you don't know may hurt you.**

**Carla M. Johnson**





# ZOONOSIS



(1) The hookworm latches on the walls of the colon with its sharp teeth where it feeds on blood. (2) The tapeworm is the longest parasite. A mature adult can lay a million eggs a day. (3) Tapeworm eggs embedded in the colon. (4) The roundworm can grow to be 20 inches (50 cm) long and lay 200,000 eggs per day. (5) Pinworms migrate outside the colon during the night to lay their eggs around the anus. This causes the nightly itching of many unsuspecting victims.

**SO MANY THINGS LURKING OUT THERE THAT THESE ANIMALS CAN PASS ON TO US**





# ZOONOSIS



- \* **Zoonoses Defined**
  - **Importance to Wildlife Rehabilitators**
- \* **Causative Agents:**
  - **Bacteria, Viruses, Parasites, Fungi & Protozoal**
- \* **Disease Prevention & Control**
  - **Handwashing Techniques**
- \* **Emerging Issues and Human Health Concerns:**
  - **Increase in vector born illnesses**
  - **Microbial resistance**
  - **Biosecurity & Bioterrorism**



# ZOONOSIS

**\*Diseases that pass between animals and humans.....**

**Understand this**

**Or**

**Eat Poop and Die!**



**\* You should focus on:**

**How you can get**

**&**

**Ways to protect yourself from disease**

**\*It is estimated that there are more than 780 infections & diseases of animals that are transmissible to humans under certain conditions.**



# ZOONOSIS



## Disease Control & Prevention

### Disease Transmission:

**Directly from one vertebrate host to another via direct contact.**

**Indirect transmission via intermediate host (vectors) ticks.**

**Indirect transmission involving aerosol particles or fomites.**

### Disease enters the body by 1 or more of 6 routes:

**Inhalation**

**Inoculation-bite**

**Through mucosa**

**Ingestion**

**Through a break in the skin**

**Passing through the skin**



# ZOONOSIS

## Causative Agents:

### Bacteria (Bacterial Diseases)

Chlamydiosis/Psittacosis/Ornithosis, Leptospirosis, Lyme Disease, Rocky Mountain Spotted Fever, Salmonellosis, Tularemia

### Viruses

California Encephalitis/La Crosse Encephalitis, Hantavirus Pulmonary Syndrome (HPS), Rabies, West Nile Disease, COVID-19

### Parasites

Ascariasis, Babesiosis, Baylisascaris procyonis (raccoon roundworm), Cryptosporidiosis, Giardiasis, Toxoplasmosis, Toxocariasis (Visceral Larval Migrans), Trichinosis

### Fungi/Mycoses

Aspergillosis, Cryptococcosis & Histoplasmosis, Ringworm





# ZOONOSIS

## Causative Agents

### Bacteria:

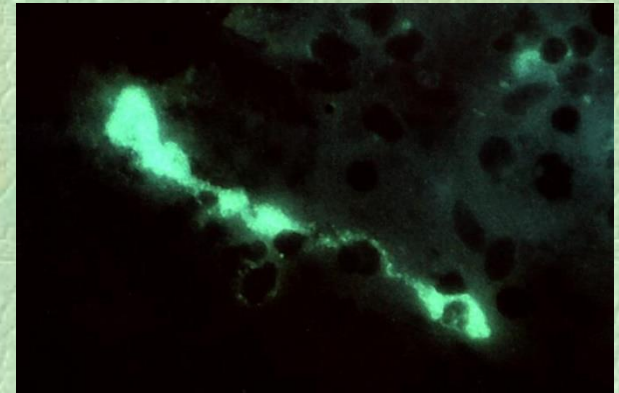
Chlamydiosis  Psittacosis/Ornithosis

\*Chlamydia Psittaci

\*Aerial transmission of dried secretions by pet birds, turkeys, chickens, ducks, sparrows & gulls

\*Fever, chills, headache, muscle aches, dry cough

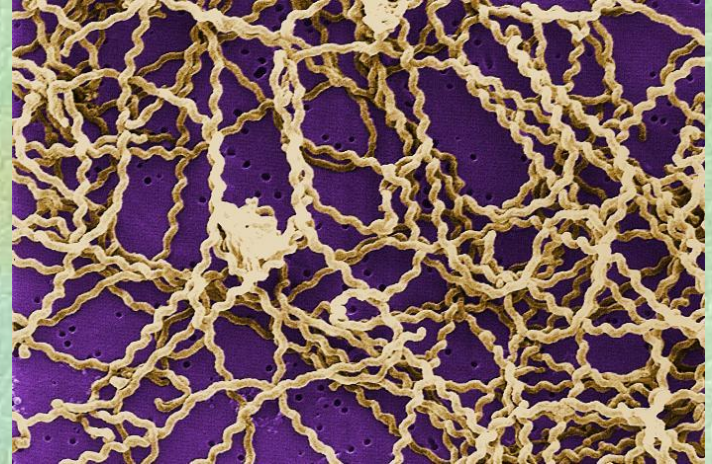
\*Can be difficult to diagnose





# ZOONOSIS

## Causative Agents



### Bacteria:

#### Leptospirosis

\*Leptospira

\*Exposure to urine contaminated water by cattle, pigs, horses, dogs, rodents and squirrels (rodents shed their entire lifetime w/o clinical signs)

\*2 days to 4 weeks

\*1st stage = fever, chills, headache, muscle aches, vomiting & diarrhea

\*2nd stage = Weil's disease = kidney/liver failure or meningitis<sub>8</sub>







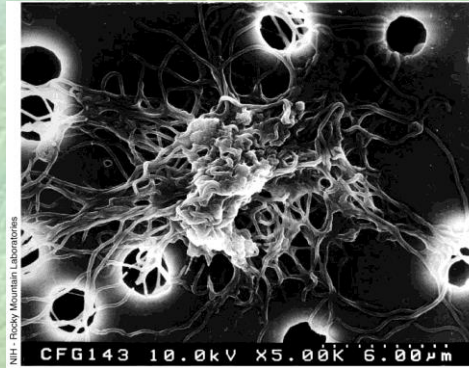
# ZOONOSIS

## Causative Agents:



## Bacteria:

### Lyme Disease



**\*Borrelia Burgdorferi**

**\*First characterized in US in 1976**

**\*White-footed mouse, fox, raccoon, opossum, deer - 3-host tick**

**- 1<sup>st</sup> stage = rash at bite site, flu like symptoms**

**- 2<sup>nd</sup> stage = weeks to months later = cardiac & neurological abnormalities**

**- 3<sup>rd</sup> stage = months to years later = arthritis of large joints & chronic skin infections**



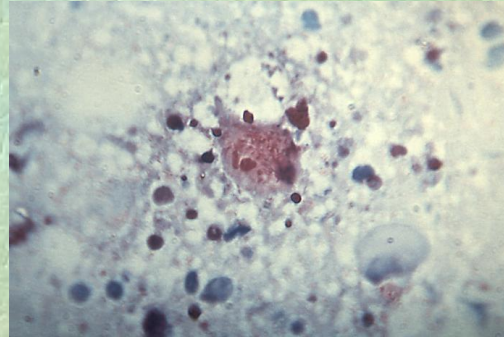


# ZOONOSIS

## Causative Agents:

### Bacteria:

#### Rocky Mountain Spotted Fever



\**Rickettsia rickettsii*

\*American Dog Tick and Rocky Mountain Wood Tick

\*White-footed mouse, fox, raccoon, opossum, deer - 3-host tick

\*Flu-like symptoms including lack of appetite show up 3-14 days after bite

\*Treatment is by antibiotics

\*If left untreated can cause organ & tissue damage and death within 8 days of first symptom





# ZOONOSIS

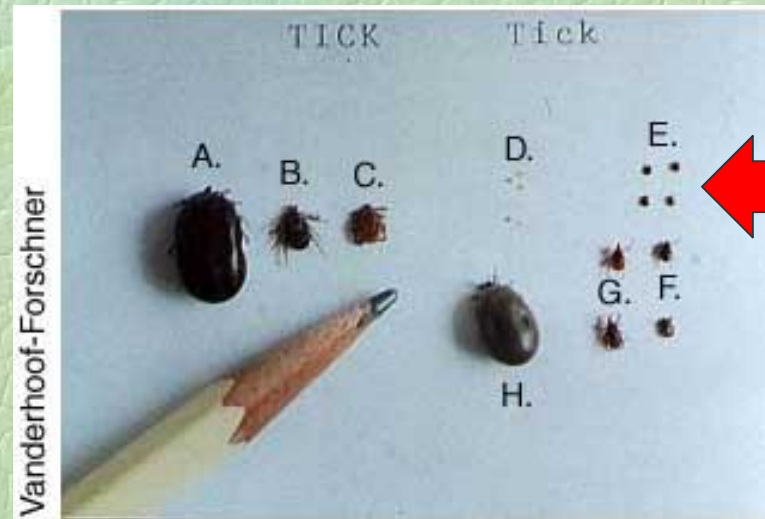
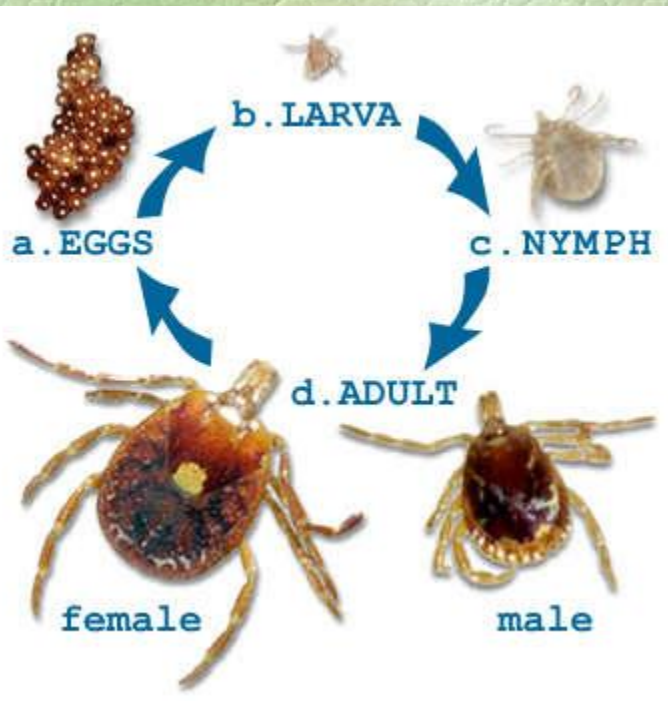
Causative Agents:  
Bacteria:



Texas Department of Health

## Rocky Mountain Spotted Fever

- \*Transmitted through saliva after several hours of attachment
- \*Ticks b/c infected in either larval, nymphal or adult stages



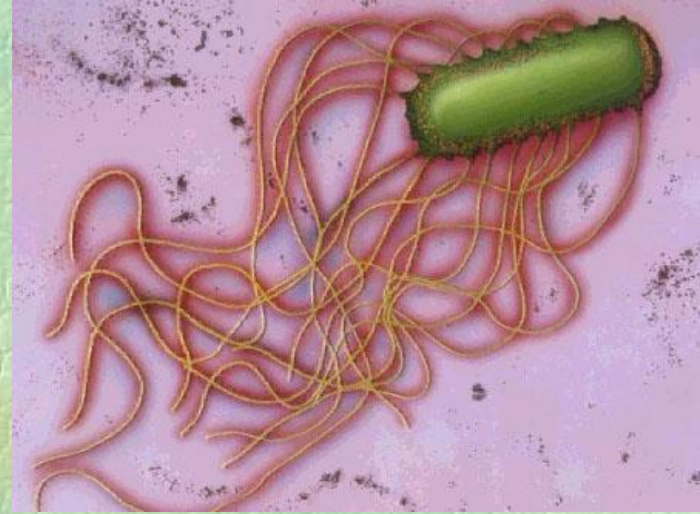
- A. Engorged female
- B. Female
- C. Male
- D. Larvae
- E. Nymphs
- F. Males
- G. Females
- H. Engorged female





# ZOONOSIS

## Causative Agents:



### Bacteria:

#### Salmonella

- \*Salmonella
- \*Occurs in mammals, birds, & reptiles.
- \*One of the world's most widespread diseases.
- \*6 hrs to 6 days
- \*Diarrhea, fever and abdominal cramps
- \*Lasts 4 to 7 days and is usually self-limiting





# ZOONOSIS

## Causative Agents: Bacteria:



### Tularemia

\*Francisella tularensis

\*Occurs in rodents, rabbits & hares.

\*Transmission by infected tick, deerfly or insect

\*Handling infected animal carcasses

\*Eating/drinking infected food/water

\*Inhaling the bacteria

\*Sudden fever, chills, headaches, diarrhea, muscle aches, joint pain, dry cough, progressive weakness, pneumonia chest pain, trouble breathing



**Consult your doctor at first sign of illness**





# ZOONOSIS

## Causative Agents: Virus La Crosse Encephalitis

- \*Chipmunks, squirrels, mosquitoes
- \*Survives the winter in the mosquito
- \*Incubation period 5-15 days
- \*Fever, headache, nausea, vomiting, lethargy
- \*Inflammation of the brain, CNS signs



2010-2019





# ZOONOSIS

## Causative Agents: Virus

### Hantavirus Pulmonary Syndrome (HPS)

Rodents shed virus in urine, droppings and saliva

Initial symptoms: fatigue, headache, muscle aches, dizziness, chills & vomiting

4-10 days after initial symptoms: coughing and shortness of breath





# ZOONOSIS

## Causative Agents: Virus

### Lymphocytic Choriomeningitis (LCM)

Mice, rats, hamsters, guinea pigs carry for lifetime but show no signs

Shed virus in urine, droppings and saliva = aerosolization, break in skin, bite, organ transplant

8-13 days after exposure

1<sup>st</sup> phase = flu-like symptoms for up to 2 weeks  
recover for a few days

2<sup>nd</sup> phase = meningitis, encephalitis and hydrocephalus coma



Common House  
Mouse







# ZOONOSIS

## Causative Agents: Virus



### Rabies:

- \* All warm-blooded mammals can transmit the disease, especially bats.
- \* High rates of infection in Skunks, Raccoons and Foxes
- \* Rare in Rodents, Lagamorphs, and Opossums.



The best protection for you and the animal in your care is

**TO AVOID BEING BITTEN, SCRATCHED**

**OR LICKED!!**

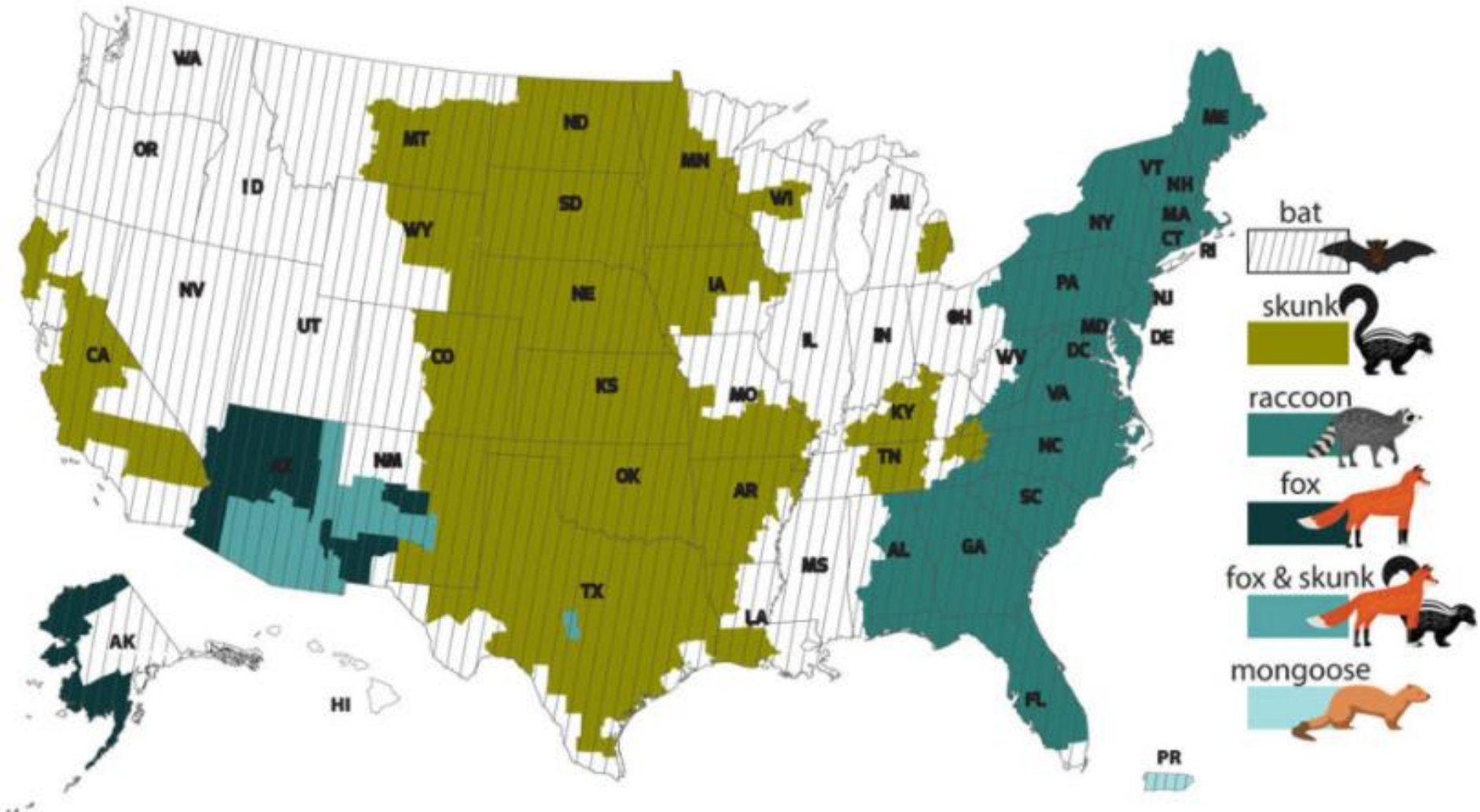




# ZOONOSIS



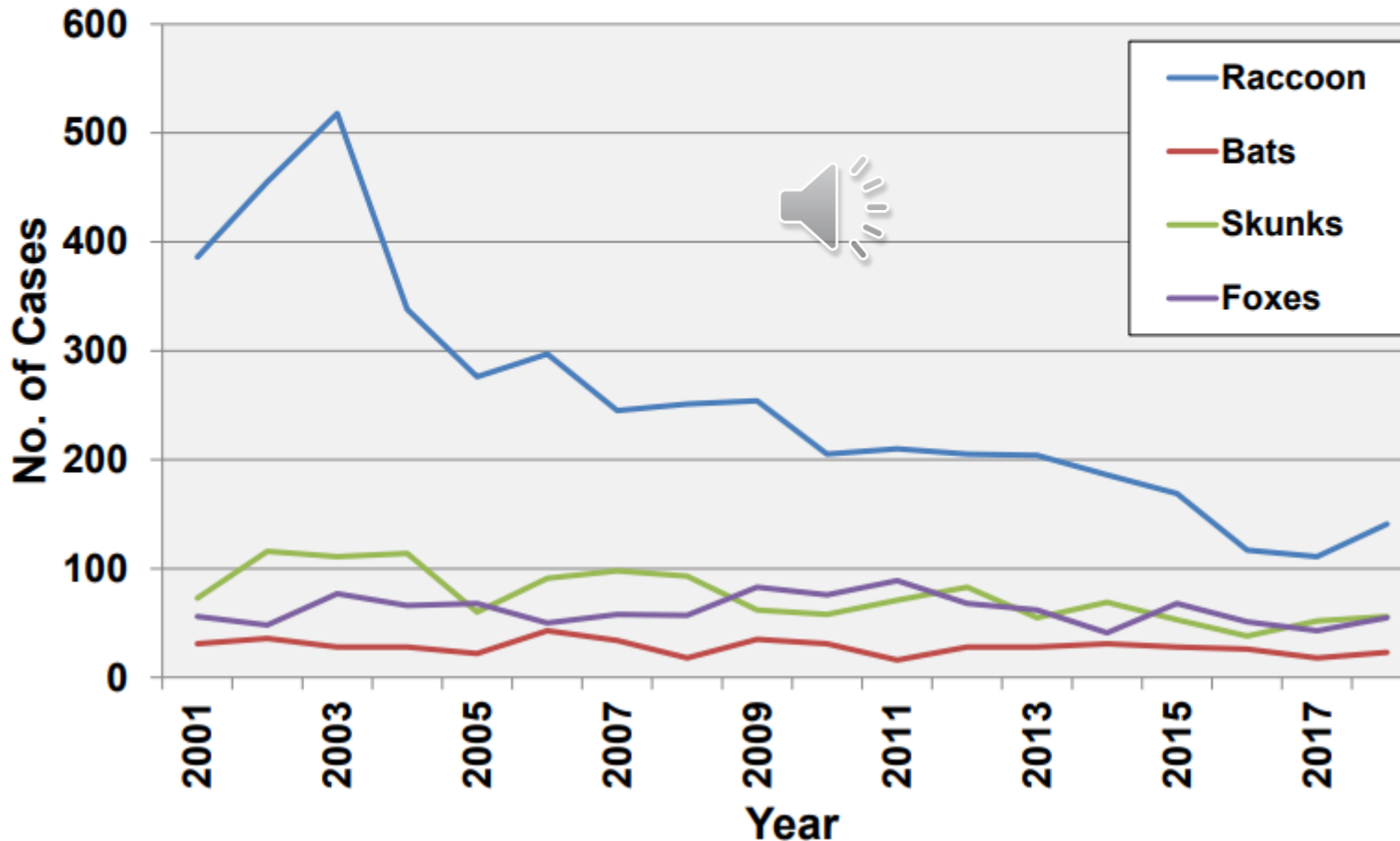
Distribution by animal across the US





# ZOONOSIS

## *Rabies North Carolina: Number of Positive Wild Mammals by Species by Year, North Carolina, 2001 – 2018 (n = 7,542)*





# ZOONOSIS

## Causative Agents: VIRUS



Mosquito

### West Nile Virus

- \* 3 to 14 days after being bitten
- \* 80% of people don't show symptoms
- \* 20% = fever, headache, body ache, nausea, swollen glands
- \* .01% of 20% = high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis





# ZOONOSIS

## Causative Agent:

### PARASITES:

- \* **Baylisascaris procyonis (raccoon roundworm)**
- \* **Baylisascaris columnaris (skunk roundworm)**
- \* **Babesiosis**
- \* **Cryptosporidiosis**
- \* **Ehrilichiosis**
- \* **Giardiasis**
- \* **Toxoplasmosis**
- \* **Trichinosis**
- \* **Toxocariasis (Visceral Larval Migrans)**





# ZOONOSIS

## Causative Agent: PARASITES



### Baylisascaris procyonis (Raccoon Roundworm)

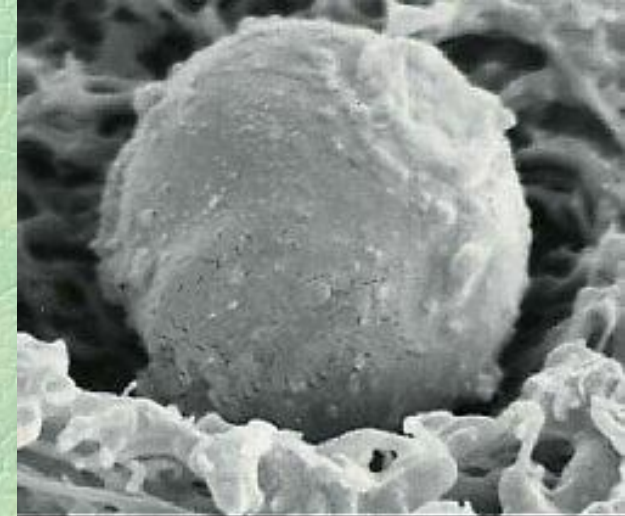
- \*Millions of eggs produced in intestine and passed out in feces
- \*Does not affect raccoon
- \*Nausea, tiredness, liver enlargement, loss of coordination, lack of attention to people/surroundings, loss of muscle control coma, blindness and possibly death





# ZOONOSIS

**Causative Agent:  
Bacteria**



*Cryptosporidium Oocyst*

## **Cryptosporidiosis**

### **Symptoms:**

**Dehydration  
Weight loss  
Stomach cramps or pain  
Fever  
Nausea  
Vomiting**



**usually last about 1 to 2 weeks.**

**The symptoms may go in cycles in which you may seem to get better for a few days, then feel worse again before the illness ends**



# ZOONOSIS

## Causative Agents:



### FUNGI OR MYCOSIS:

**Aspergillosis** – lung fungus from moldy hay also called farmer’s lung

**Cryptococcosis** – yeast like lung fungus that sometimes spreads to the brain

**Histoplasmosis** – fungus found in bird and bat droppings; not serious if confined to lungs but fatal if spread throughout body

**Ringworm** – also known as athlete’s foot or jock itch, caused by fungus







# ZOONOSIS

## Causative Agents:



### PROTOZOAL DISEASES:

- \*Giardiasis - Most frequently diagnosed intestinal parasitic disease in the US.**
- \*Toxoplasmosis - common source is cats.**



# ZOONOSIS



## Disease Control & Prevention

**Rationale:** You can't provide good rehabilitative care if you are sick.

**Prevention of Disease Transmission:**

- Good Handwashing**
- Good Cleaning protocols**
- Careful handling of animals**
- Proper disposal of fecal materials**
- Proper protective gear**
- Using your common sense**



# ZOONOSIS

## HANDWASHING



**Fingernail Brush, Latex Gloves**

**When should you wash your hands?**

**Rehab Space  
New Intakes  
Cleaning cages  
Feeding animals/litters  
Handling patients  
Bedding/Nest Box  
Exiting Rehab Space**



# ZOONOSIS

## CLEANING PROTOCOLS

### Cleaning versus Disinfecting

Cleaning Solutions – There are many

**1:10 BLEACH TO WATER SOLUTION**

**Just as a wildlife rehabilitator would never neglect the care of an animal, never neglect the care of the workplace**





# ZOONOSIS

## HANDLING ANIMALS

Caution must be taken when handling all wildlife, even babies

Do not allow babies to lick you or climb all over you. **NO FRENCH KISSES!!**

**Capture & Restraint of Small Mammals & Birds**





# ZOONOSIS

**Proper disposal of fecal material and  
proper protective gear**

**Double bag rehab trash**

**When to wear gloves, mask, face shield, etc.**





# ZOONOSIS



# COMMON SENSE





# ZOONOSIS

## Emerging Issues & Human Health Concerns:

- \*Increased vector born illness**

- \*Microbial resistance**

- \*Biosecurity & Bioterrorism**







# ZOONOSIS



## Useful WEB Sites:

Emerging Infectious Diseases, CDC

<http://www.cdc.gov/ncidod/eid/vol4no3/murphy.htm>

Field Manual of Wildlife Diseases,

[http://www.nwhc.usgs.gov/pub\\_metadata/field\\_manual/field\\_manual.html](http://www.nwhc.usgs.gov/pub_metadata/field_manual/field_manual.html)

Health Concerns to be Aware of When Working With Wildlife (a.k.a.-Zoonoses)

The Humane Society of the United States

[www.tc.umn.edu/~devo0028/zoonos.htm](http://www.tc.umn.edu/~devo0028/zoonos.htm)

Melissa Kaplan's Herp Care Collection

<http://www.anapsid.org/mainzoonoses.html>

Overview of Zoonoses, LA Public Health, Veterinary Public Health

<http://www.lapublichealth.org/vet/guides/vetzooman.htm>

Parasitic Pathways, Division of Parasitic Disease, CDC

<http://www.cdc.gov/ncidod/dpd/parasiticpathways/animals.htm>

ZOONOSES or Everything I Didn't Want to Know About Wildlife Diseases

[www.anglefire.com/nj/woundedknee/zoonoses.html](http://www.anglefire.com/nj/woundedknee/zoonoses.html)



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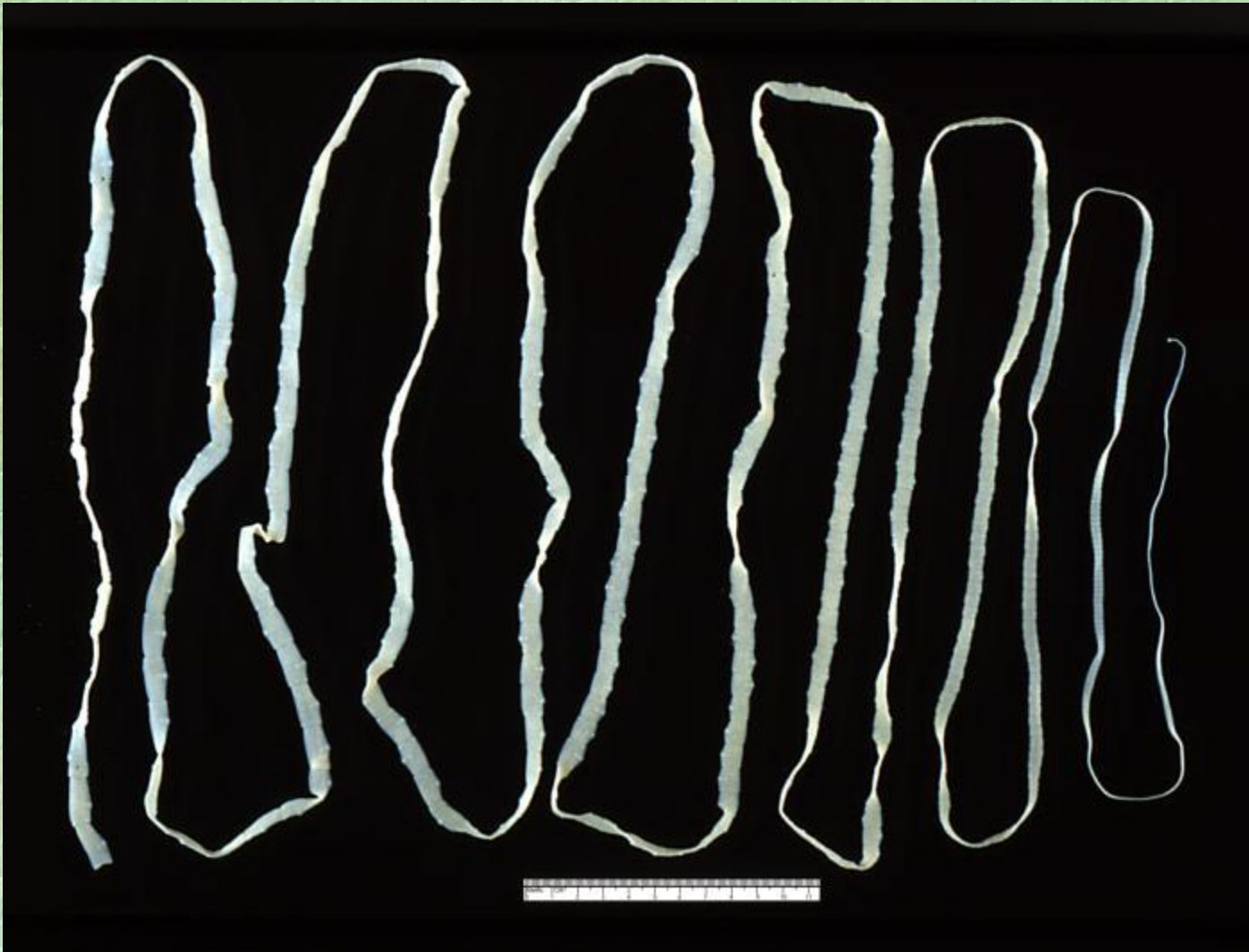


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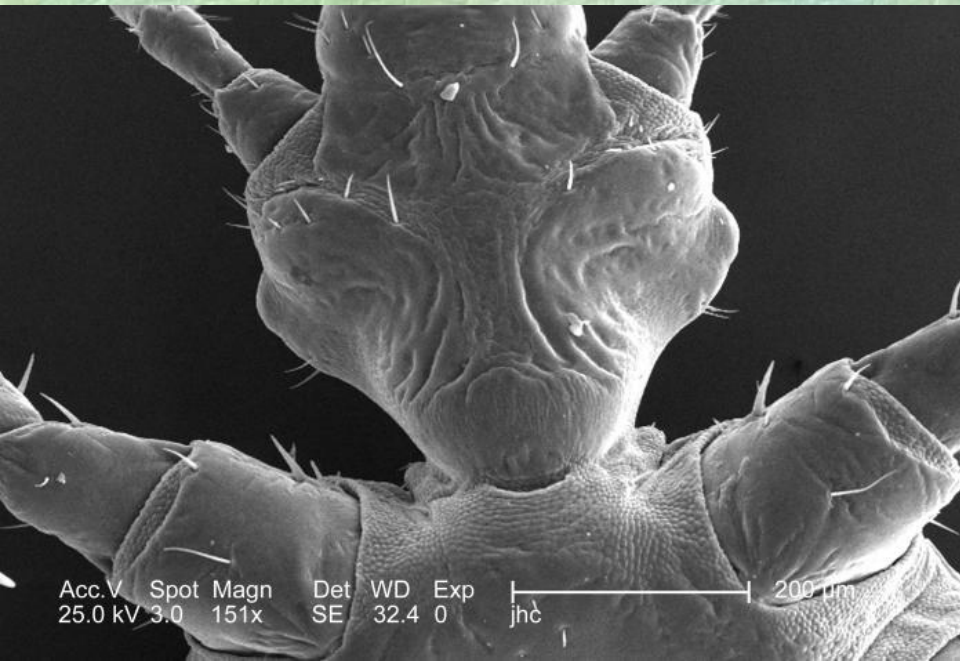


# ZOONOSIS





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**NOW LET'S WATCH A CDC VIDEO ON  
PROPER HAND WASHING TECHNIQUES**