

Welcome! We will begin at 7pm.

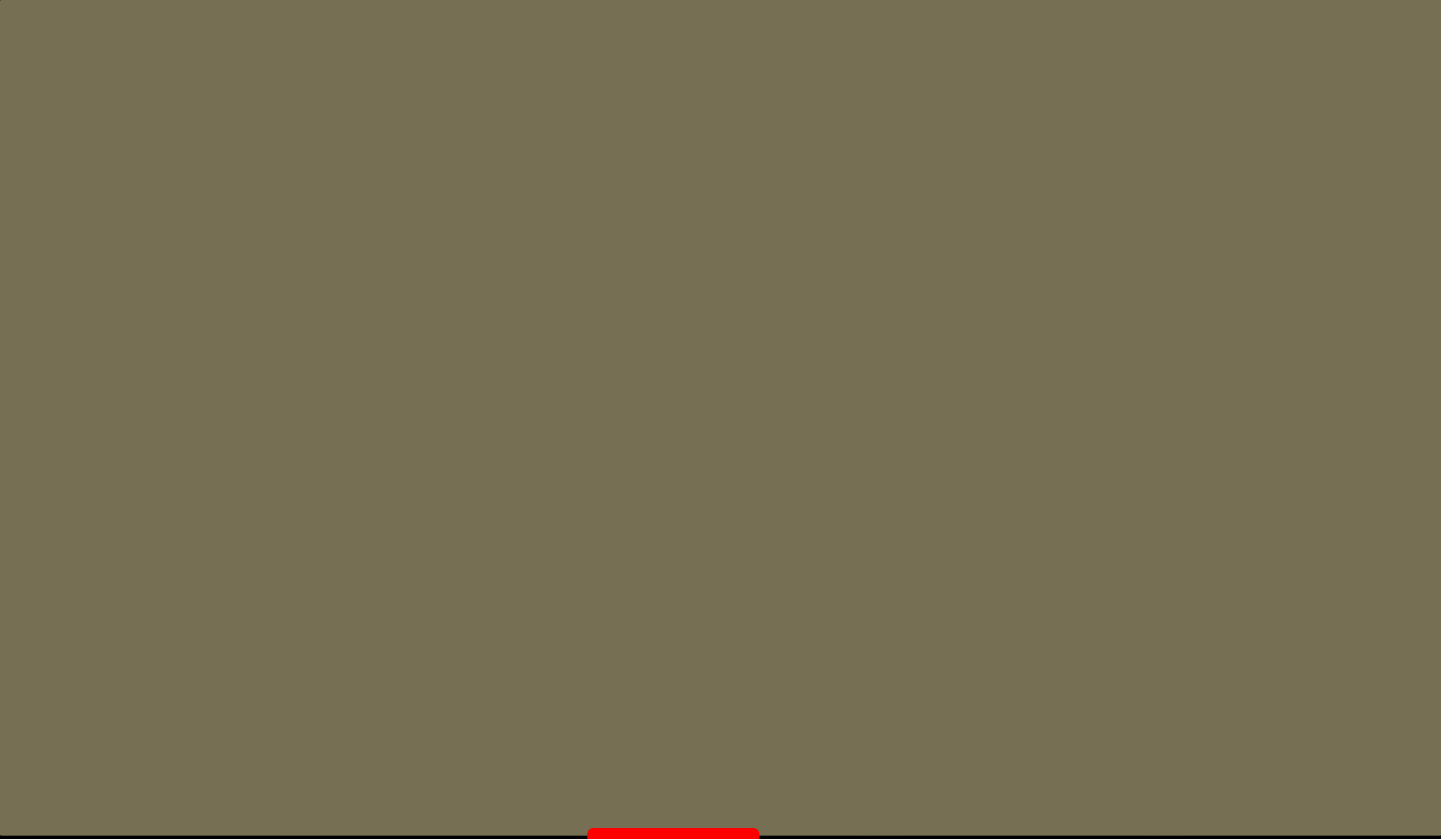
- Please be sure to turn your video off for the presentation and mute yourself.
 - When the presentation starts, if you cannot hear me through your computer, you can also call in to the meeting for audio using the number provided in your confirmation email (please be sure to mute your phone if you do this)
- Thank you!

Why is everyone so ticked off? Ticks and tick-borne diseases in Upstate New York

Mandy Roome
May 2020



Bassett Healthcare Network
Research Institute



Unmute Start Video

Participants 27

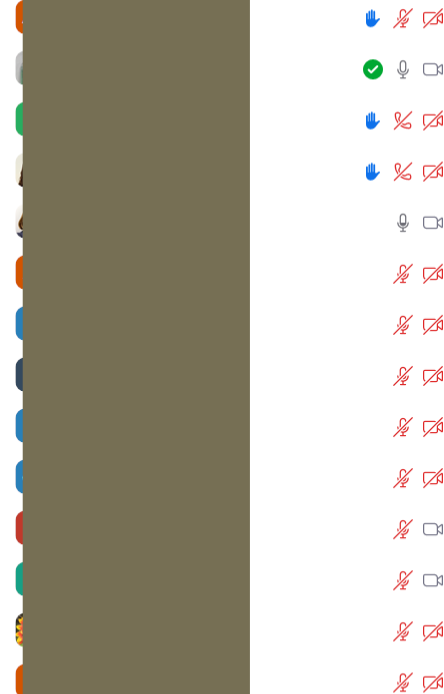
Share Screen Reactions

Leave Meeting

Please click “raise hand” if you have a question.

Please be sure to unclick “raise hand” after I’ve answered it.

You can also type your questions in the chat box.



Raise Hand



yes



no



go slower



go faster



more

Invite

Unmute Me



QUESTION 1



TICKS AND THE DISEASES THEY CAN TRANSMIT IN NEW YORK



QUESTION 2

QUESTION 3



QUESTION 4



WHAT KIND OF TICKS ARE IN NY?

 TickEncounter Resource Center ***Ixodes scapularis* (Blacklegged ticks or Deer ticks)**



Larva



Nymph



Adult Male



Adult Female



QUESTION 5

LIFE CYCLE

○ Larvae

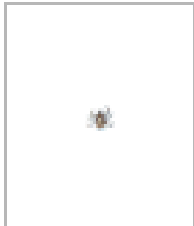
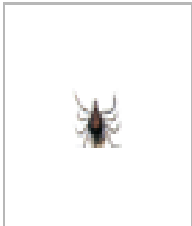

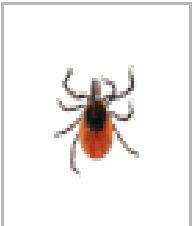
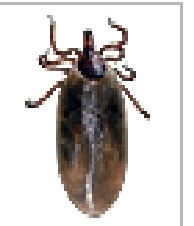

- Blood meal
- Molt

○ Nymphs

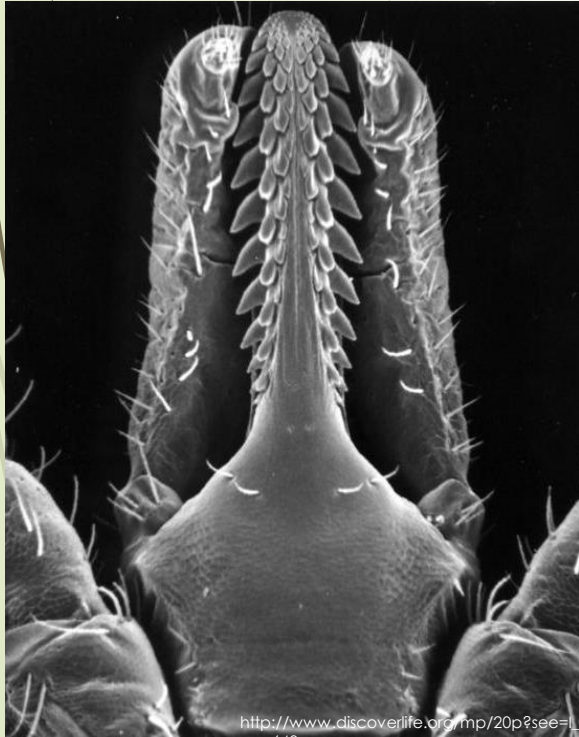
- Most likely to infect humans
- Blood meal (bacteria transmission)
- Molt

○ Adults

- Blood meal (bacteria transmission)
- Mate (on host)
- Males die
- Females lay eggs (~1000) and die

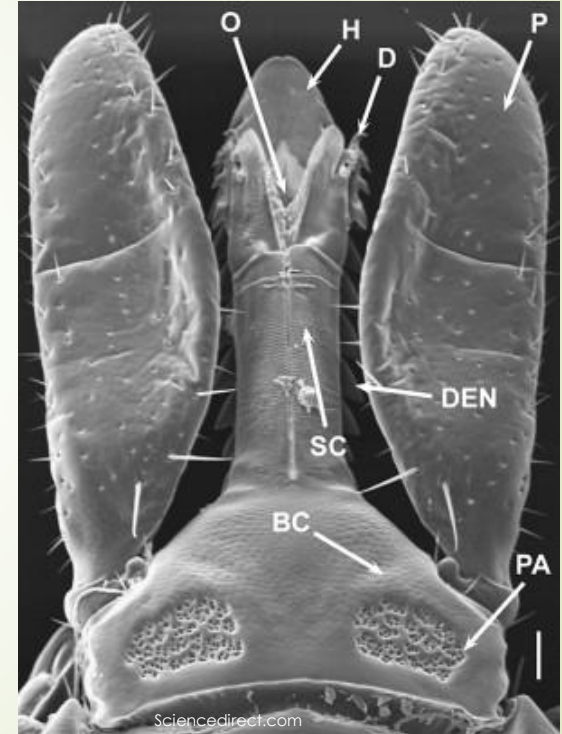
Species	Larva	Nymph	Male	Female	Partially Fed Female	Fully Fed Female
Deer Tick <i>Ixodes scapularis</i>						

FEEDING



http://www.medicalecology.org/diseases/lyme/print_lyme.htm

Anderson et. al 2008



WHAT KIND OF TICKS ARE IN NY?

 **Tick Encounter** Resource Center

***Dermacentor variabilis* (American Dog ticks)**



Larva



Nymph



Adult Male



Adult Female

WHAT KIND OF TICKS ARE IN NY?

 TickEncounter Resource Center

***Amblyomma americanum* (Lone Star ticks)**



Larva



Nymph



Adult Male



Adult Female

WHAT KIND OF TICKS ARE IN NY?

 TickEncounter Resource Center

***Rhipicephalus sanguineus* (Brown Dog Tick)**



Larva



Nymph



Adult Male



Adult Female



QUESTION 6

WHAT DISEASES CAN TICKS GIVE YOU IN THE NE?

Tick Encounter Resource Center **Ixodes scapularis (Blacklegged ticks or Deer ticks)**



- Lyme disease
- Ehrlichiosis
- Babesiosis
- Bartonella?
- Anaplasmosis
- Deer Tick Virus
- *B. miyamotoi*

Tick Encounter Resource Center **Dermacentor variabilis (American Dog ticks)**



- Rocky Mountain Spotted Fever
- Tularemia

WHAT DISEASES CAN TICKS TRANSMIT IN THE NE?

 TickEncounter Resource Center

***Amblyomma americanum* (Lone Star ticks)**



- Ehrlichiosis
- Tularemia

 TickEncounter Resource Center

***Rhipicephalus sanguineus* (Brown Dog Tick)**



- None known in Northeast
- RMSF (Southwest)



LYME DISEASE

- Caused by: bacteria, *Borrelia burgdorferi*
- Primary reservoir: white footed mouse
- Primary vector: deer tick
- Symptoms: Erythema migrans rash, flu-like symptoms, muscle pain, (etc.)
- Treatment: doxycycline or amoxicillin

ANAPLASMOSIS

- Caused by: bacteria *Anaplasma phagocytophilum*
- Primary reservoir: white-footed mouse
- Primary vector: deer tick
- Symptoms: fever, chills, headache, fatigue, muscle pain, nausea, vomiting
- Treatment: doxycycline



BABESIOSIS

- ▶ Caused by: parasite, *Babesia microti*
- ▶ Primary reservoir: white footed mouse
- ▶ Primary vector: deer tick
- ▶ Symptoms: fever, chills, sweats, fatigue, muscle pain, headache, dark urine
- ▶ Treatment: atovaquone and azithromycin OR clindamycin and quinine

B. MIYAMOTOI

- ▶ Caused by: relapsing fever
- ▶ Primary reservoir: white-footed mouse
- ▶ Primary vector: deer tick
- ▶ Symptoms: fever, chills, fatigue, severe headache, muscle pain, joint pain, dizziness, confusion
- ▶ Treatment: antibiotics similar to what is used for Lyme



DEER TICK VIRUS

- Caused by: virus (Powassan)
- Primary reservoir: skunk
- Primary vector: deer tick
- Symptoms: fever, headache, vomiting, weakness, inflammation of the brain
- Treatment: no antiviral treatment currently available

EHRlichiosis

- Caused by: *Ehrlichia chaffeensis* or *E. ewingii*
- Primary reservoir: white footed mouse
- Primary vector: deer tick, lone star tick
- Symptoms: fever, chills, headache, muscle pain, fatigue, gastrointestinal pain
- Treatment: Doxycycline

BARTONELLA

- Carried by deer ticks in high numbers
- No substantial evidence to show deer ticks transmit bartonella to humans



ROCKY MOUNTAIN SPOTTED FEVER

- ▶ Caused by: bacteria
- ▶ Primary reservoir: small mammals
- ▶ Primary vector: American dog tick
- ▶ Symptoms: fever, headache, muscle pain, swelling around eyes and back of hands, rash (10%)
- ▶ Treatment: Doxycycline

TULAREMIA

- ▶ Caused by: bacteria
- ▶ Primary vector: American dog tick and lone star tick
- ▶ Symptoms: fever, chills, headache, fatigue, joint pain, chest discomfort, cough, sore throat
- ▶ Treatment: Antibiotics

1 inch

Blacklegged Tick (*Ixodes scapularis*)



Lone Star Tick (*Amblyomma americanum*)



Dog Tick (*Dermacentor variabilis*)



2







**HOW HAS THE PROBLEM
CHANGED OVER TIME?**

Reported Cases of Lyme Disease -- United States, 2001



1 dot placed randomly within county of residence for each reported case

Reported Cases of Lyme Disease -- United States, 2006



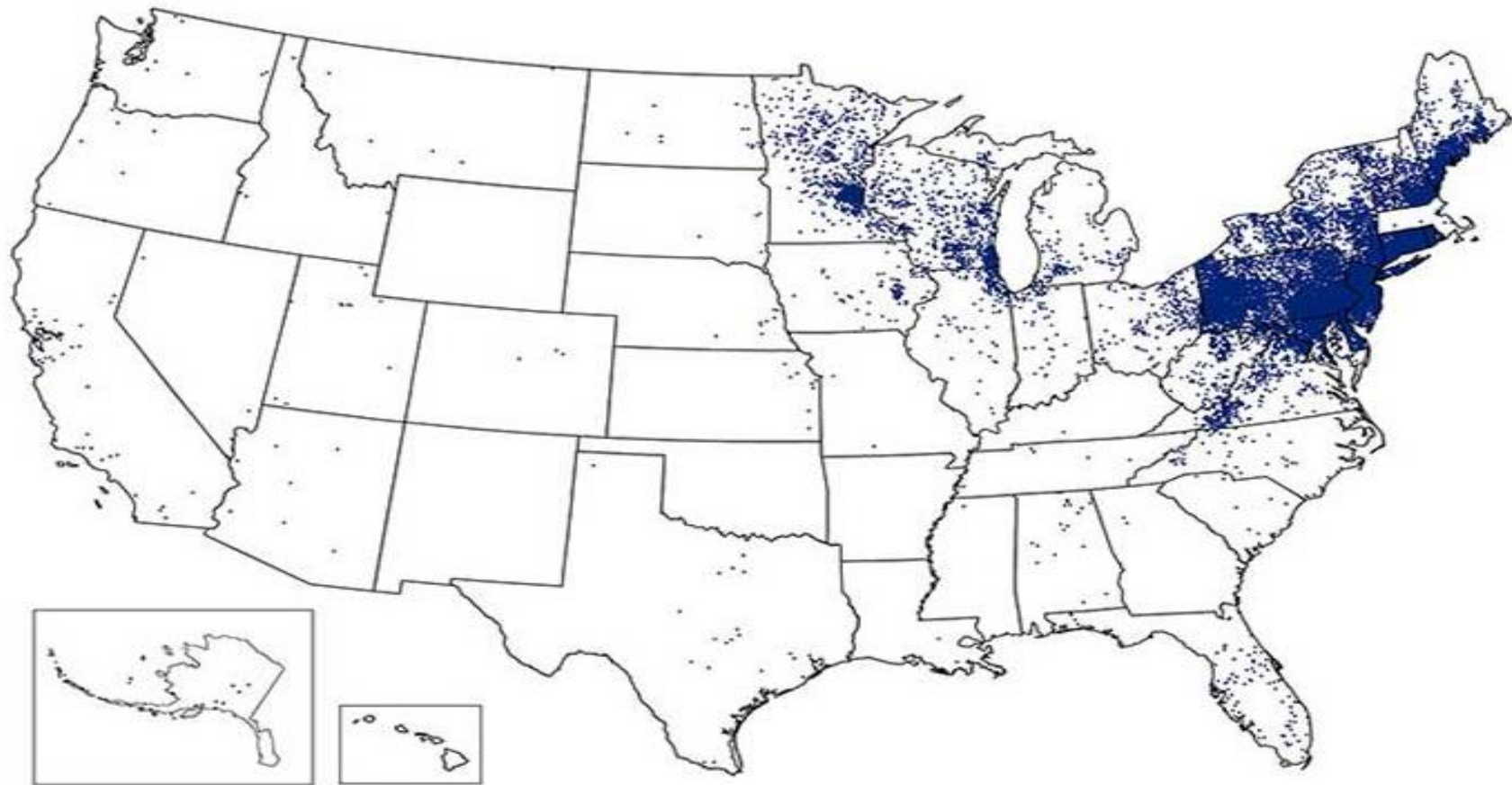
1 dot placed randomly within county of residence for each reported case

Reported Cases of Lyme Disease -- United States, 2011



1 dot placed randomly within county of residence for each confirmed case

Reported Cases of Lyme Disease - United States, 2018



1 dot placed randomly within county of residence for each confirmed case



QUESTION 7

ORIGINAL ARTICLE

Lyme Disease Surveillance in New York State: an Assessment of Case Underreporting

J. White¹, C. Noonan-Toly¹, G. Lukacik¹, N. Thomas¹, A. Hinckley², S. Hook² and P. B. Backenson¹

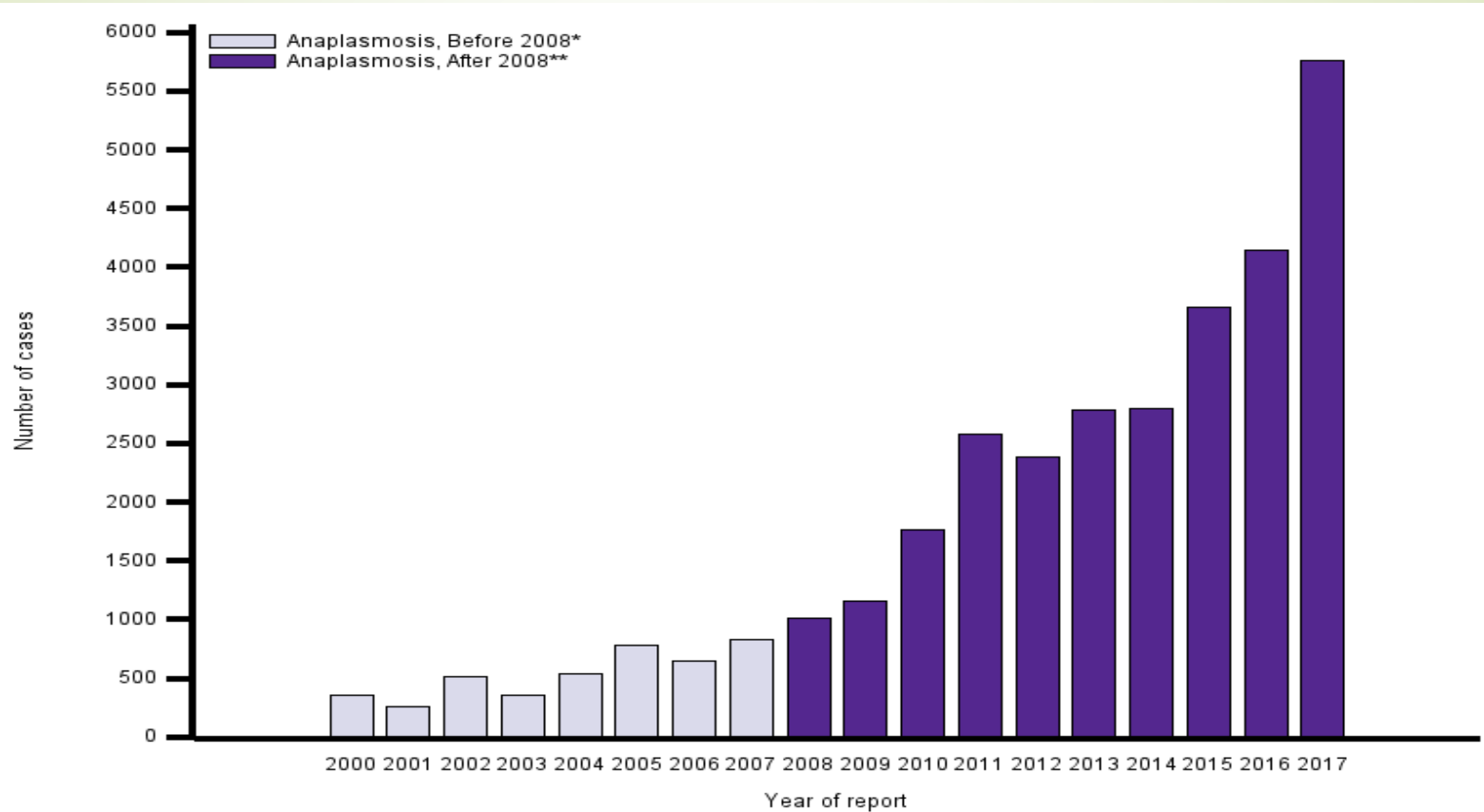
¹ New York State Department of Health, Albany, NY, USA

² Centers for Disease Control and Prevention, Fort Collins, CO, USA

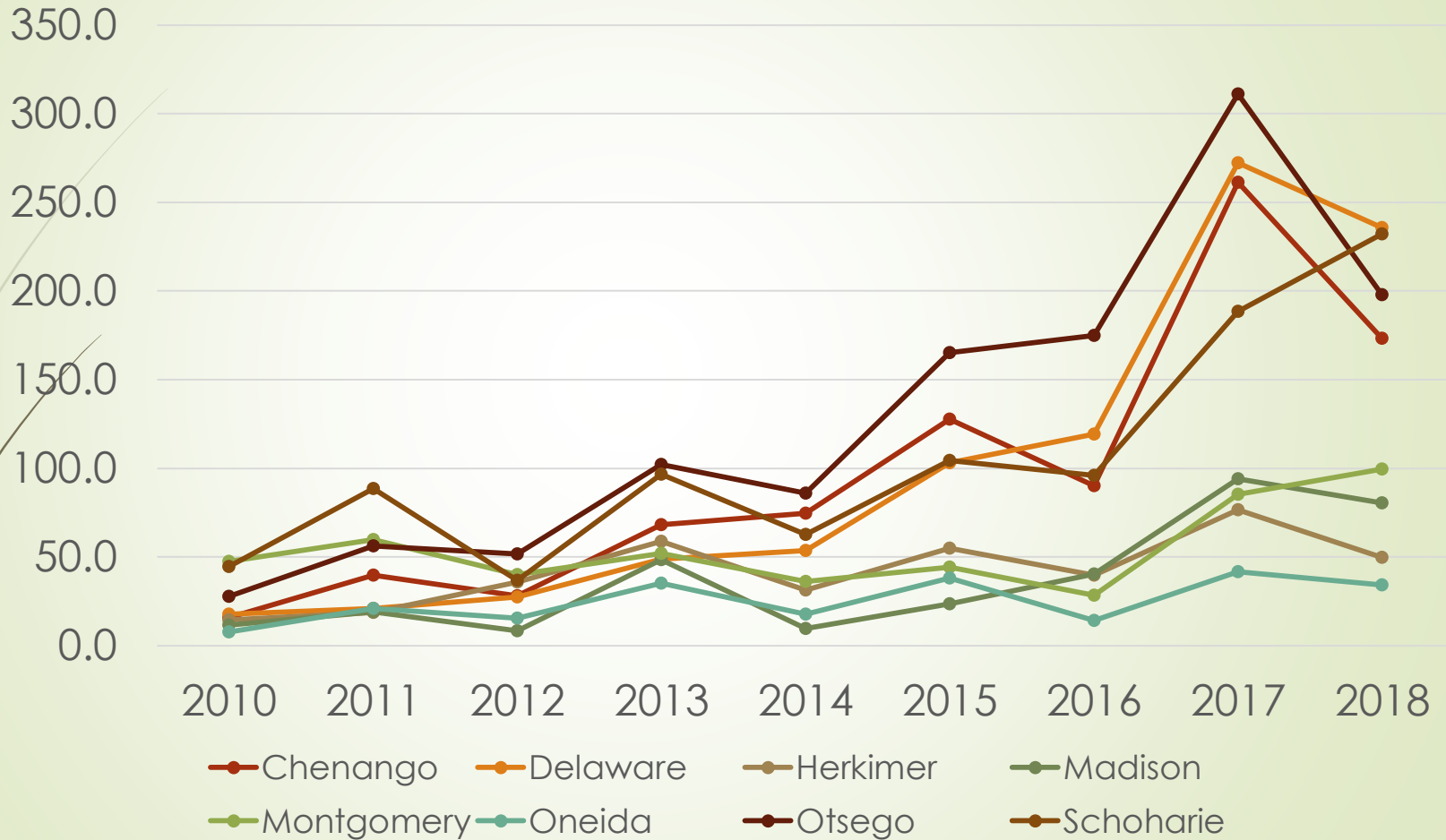
Despite the mandatory nature of Lyme disease (LD) reporting in New York State (NYS), it is believed that only a fraction of the LD cases diagnosed annually are reported to public health authorities. Lack of complete LD case reporting gener-

ing to the case definition. When including both provider underreporting and case misclassification, approximately 20% (range 18.4–24.6%) more LD cases were identified in the three-county study area than were originally reported through standard surveillance. The additional cases represent a minimum percentage of

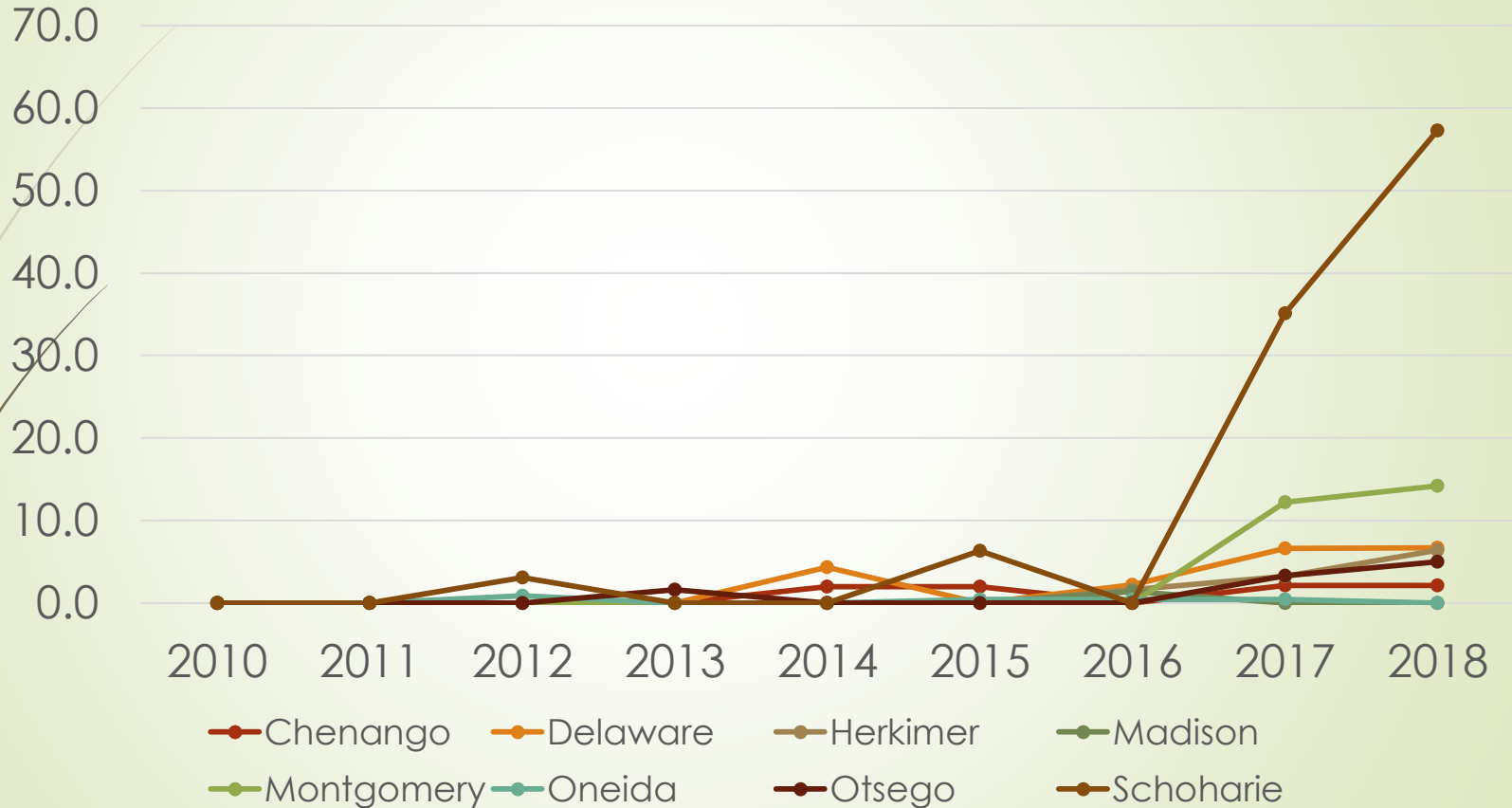
Anaplasmosis in the United States



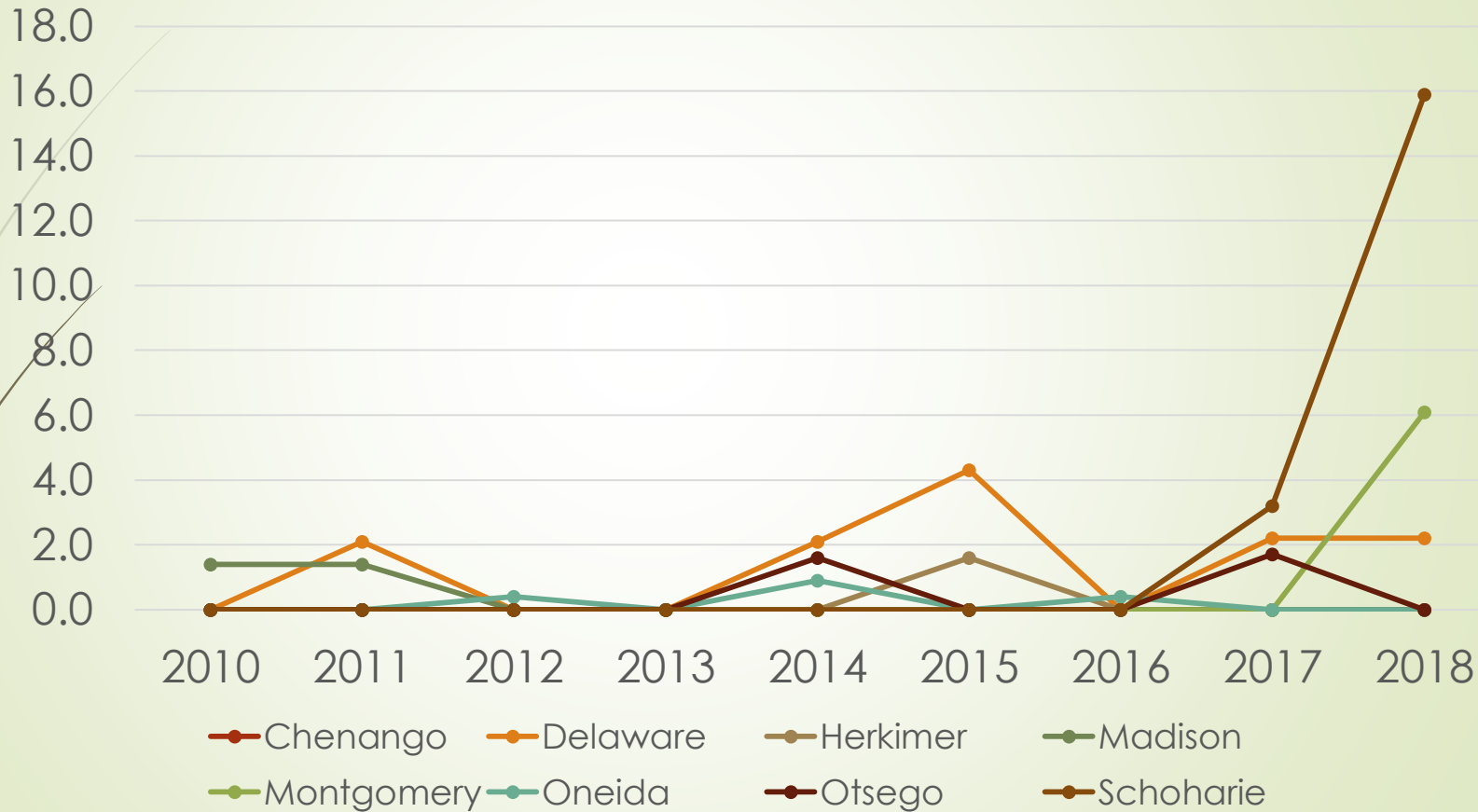
Lyme Incidence in Bassett Served Counties



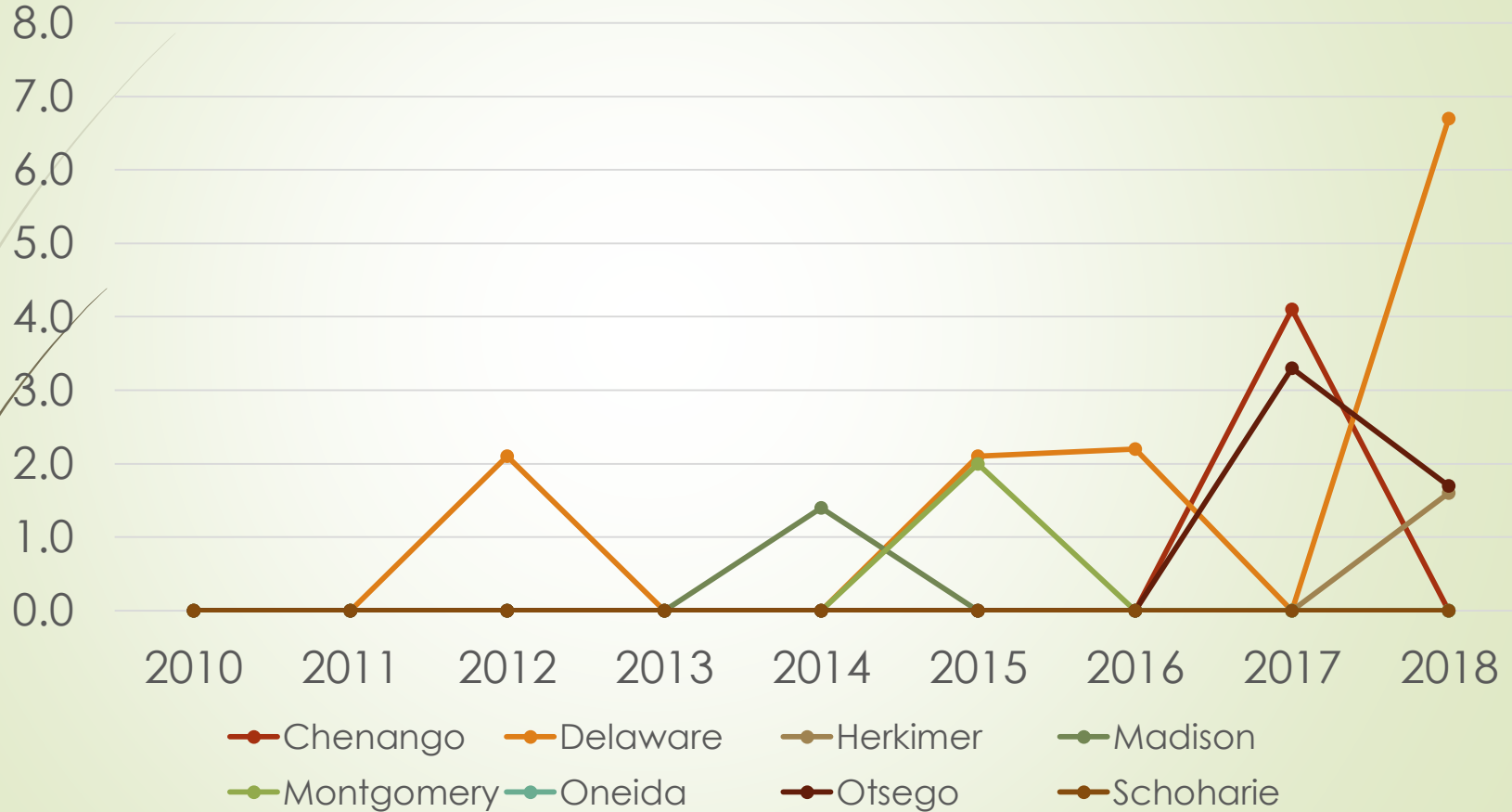
Anaplasmosis Incidence in Bassett Served Counties



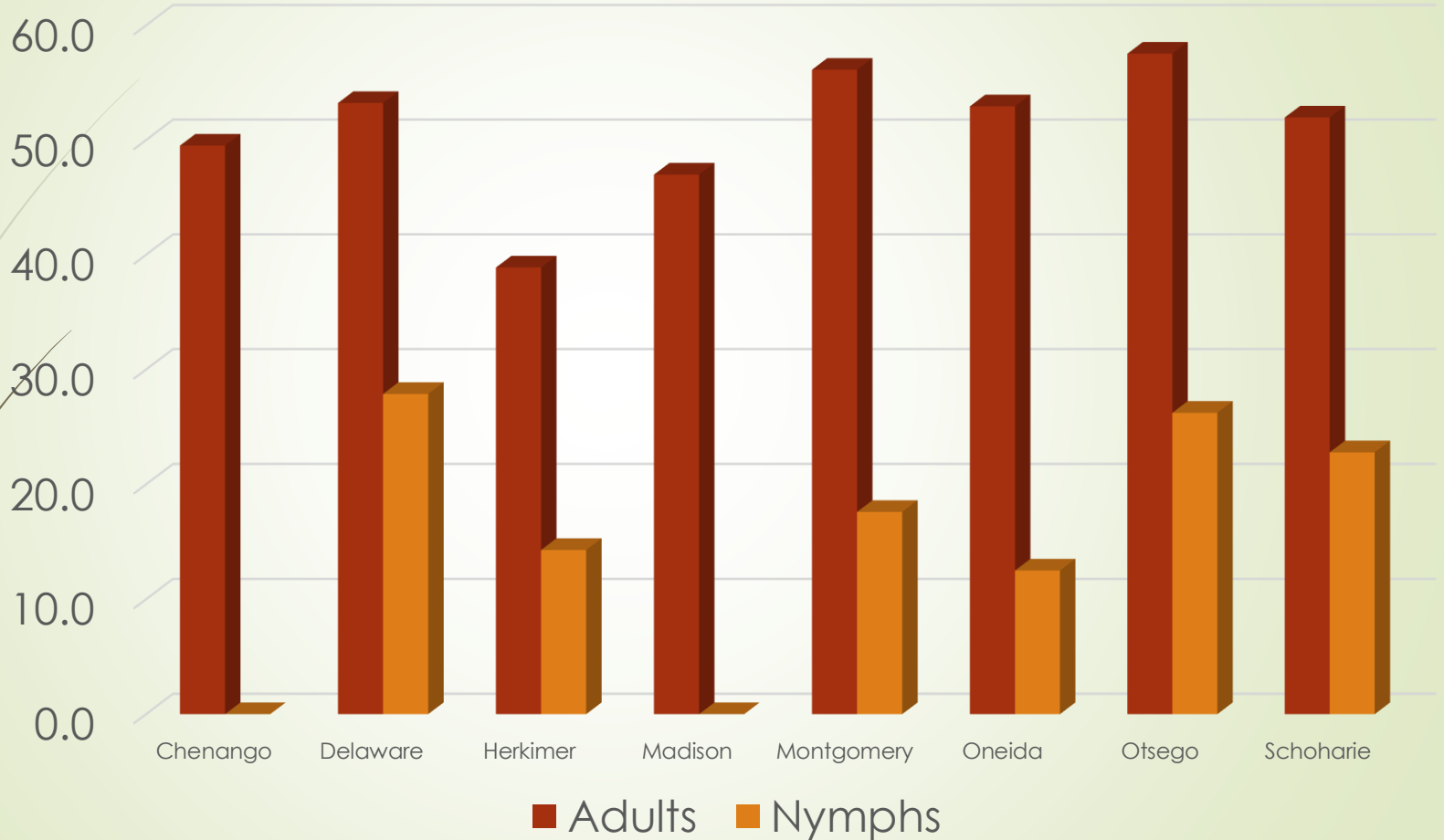
Babesiosis Incidence in Bassett Served Counties



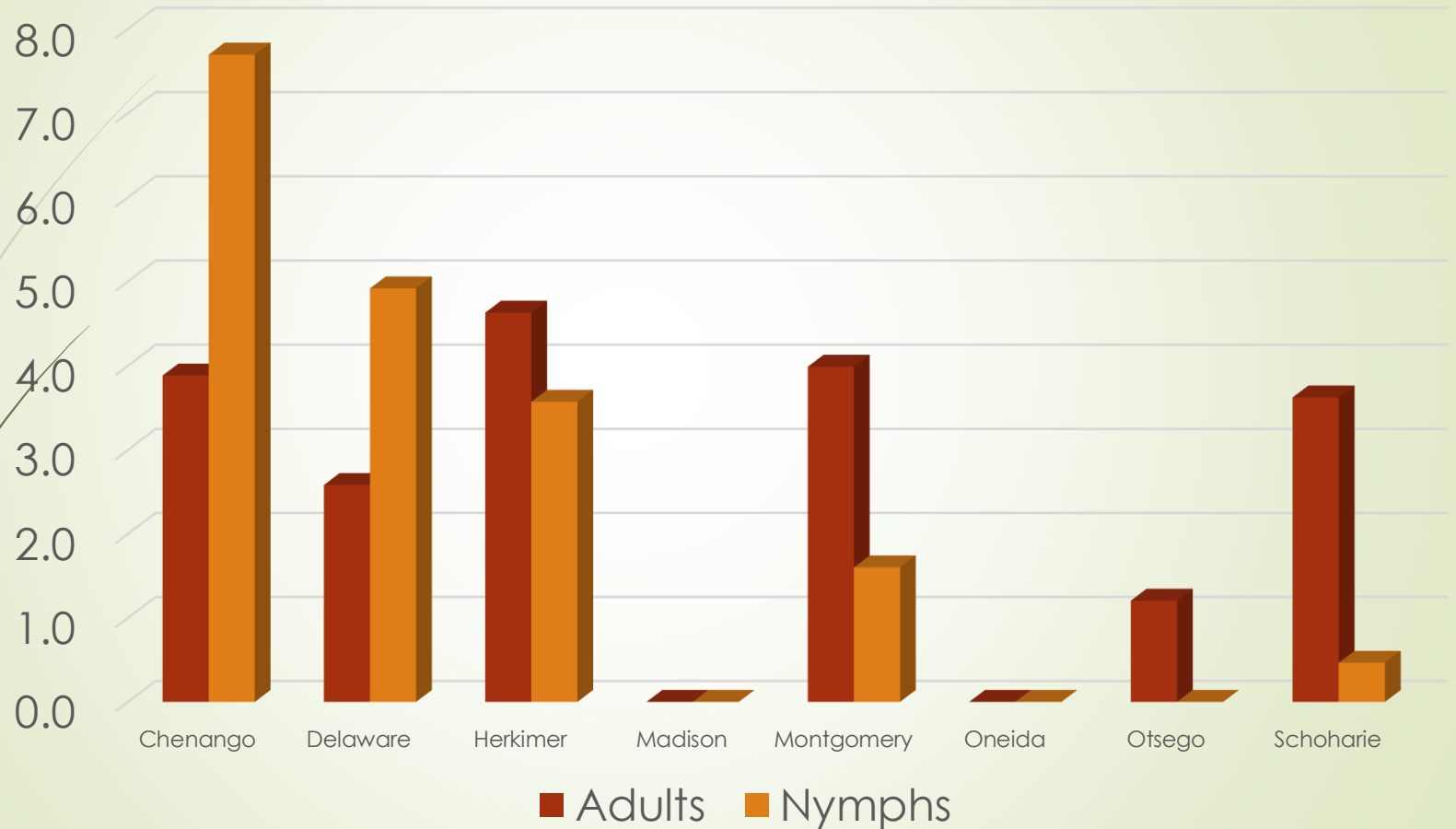
Ehrlichiosis Incidence in Bassett Served Counties



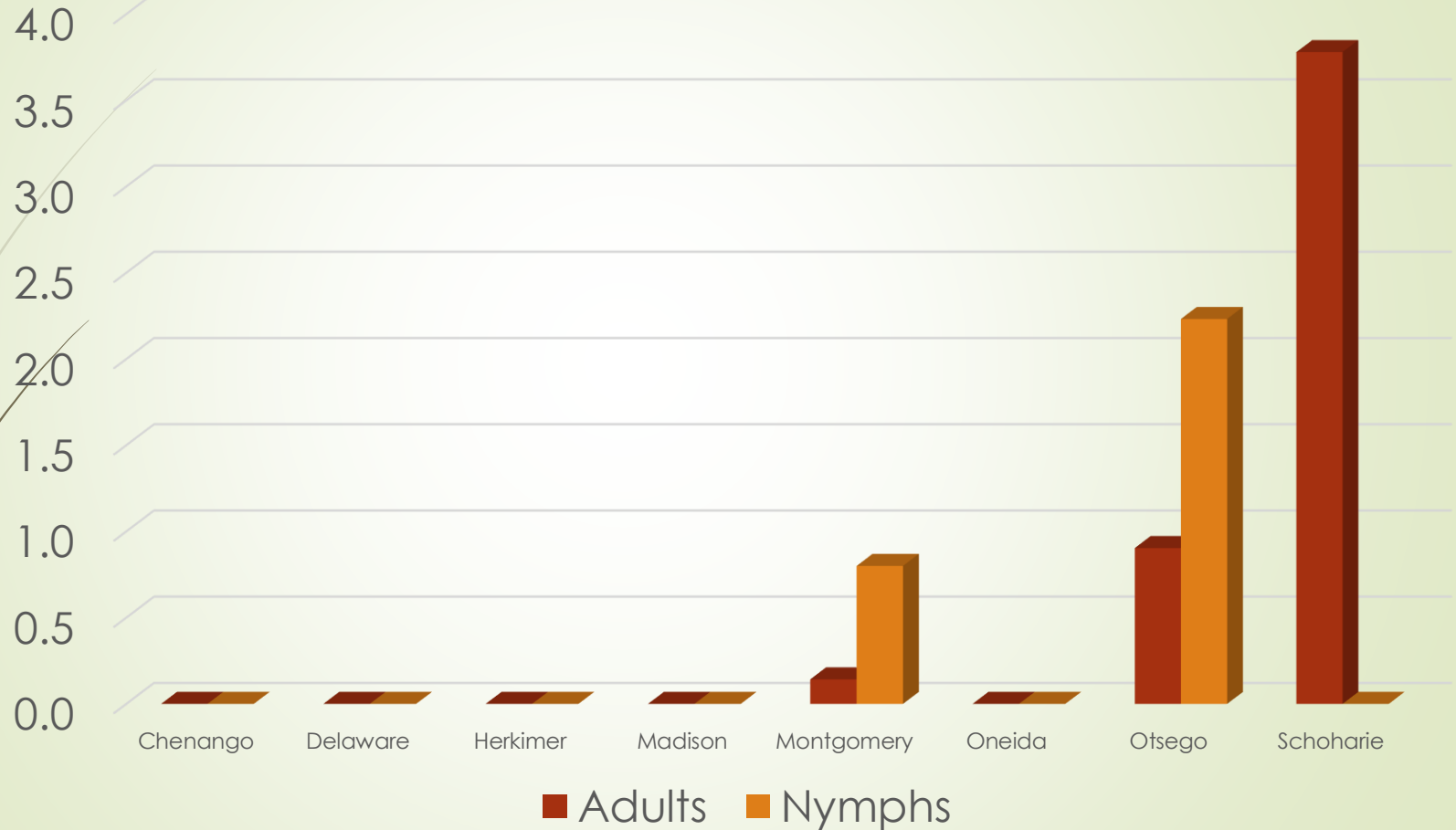
% of Ticks Carrying Lyme



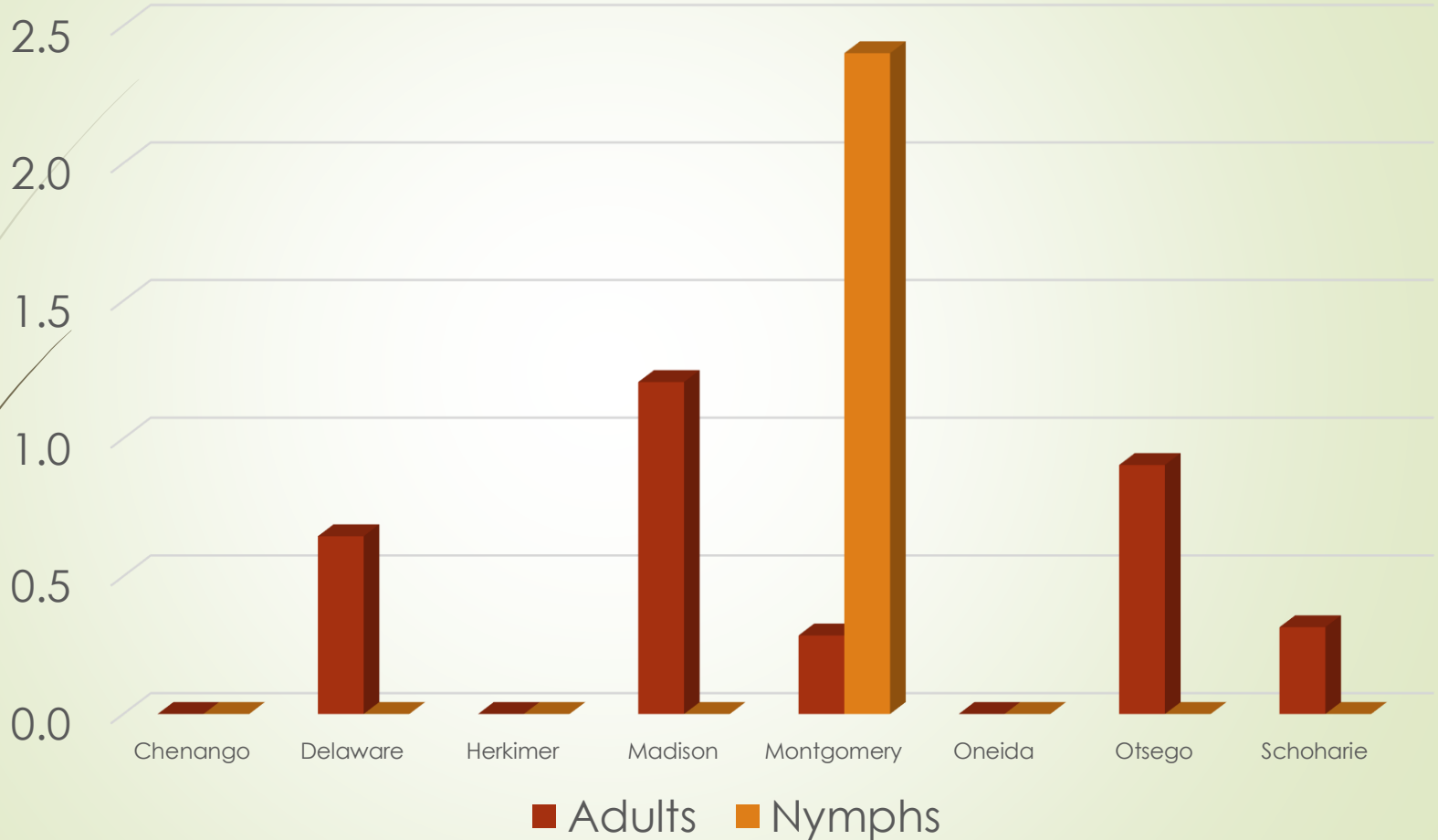
% of ticks carrying anaplasmosis



% of ticks carrying babesiosis



% of ticks carrying Ehrlichiosis





**WHY HAS THIS
CHANGED OVER TIME?**



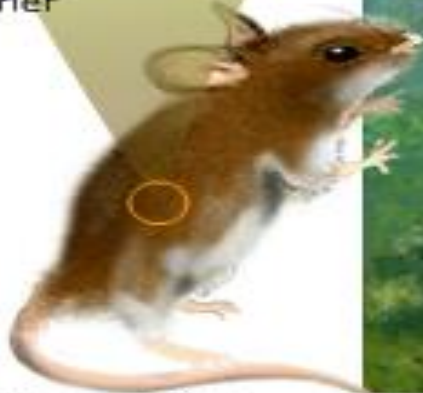
QUESTION 8



Blacklegged Tick,
Lyme Disease
Carrier



Lyme Disease-
Causing Bacterium
Borrelia burgdorferi



White-Footed Mouse



Intact Forest



total ticks

infected ticks

In Eastern and Central United States the blacklegged tick's favorite meal is the white-footed mouse, which happens to be the main host of Lyme disease. The tick infects humans and other animals with its bite.



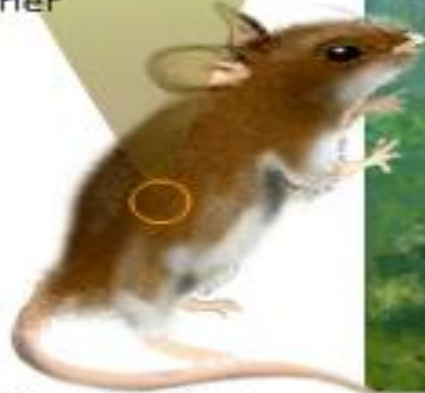
Next



Blacklegged Tick,
Lyme Disease
Carrier



Lyme Disease-
Causing Bacterium
Borrelia burgdorferi



White-footed Mouse



Intact Forest



total ticks

infected ticks

In a healthy forest, biodiversity is high and mouse populations are kept in check by predators such as fox and coyote, as well as competitors such as rabbits and squirrel. In turn, tick populations are also kept low.

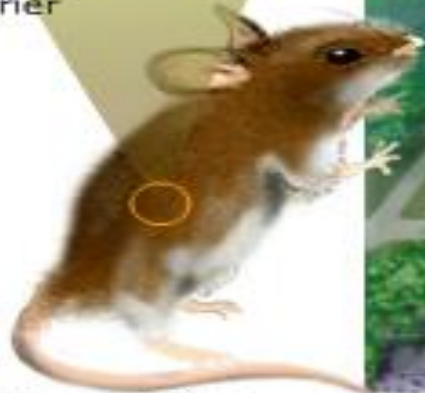




Blacklegged Tick,
Lyme Disease
Carrier



Lyme Disease-
Causing Bacterium
Borrelia burgdorferi



White-Footed Mouse



Fragmented Forest

total ticks

infected ticks

In a fragmented forest, biodiversity decreases and there are fewer predators like coyotes. In this environment, the mouse multiplies, and in turn both ticks and Lyme disease thrive.





FACT vs. FICTION



QUESTION 9

HOW LONG HAS THE LYME BACTERIA BEEN AROUND?

- Found in tick museum specimens from the 1940's in Long Island.
- Found in mouse specimens in a Massachusetts museum from 1894.
- Ötzi the ice man may have had Lyme, dating back to 5,300 years ago.
- Fossilized ticks entombed in amber found in the Dominican Republic; 15-20 million years ago. (*Borrelia* genus)



<http://www.pandpa.com/risks-and-health/lyme-bacteria-survive-28day-course-of-antibiotics-months-after-infection-1412201752/>

THERE'S ONLY YOU AND ME...

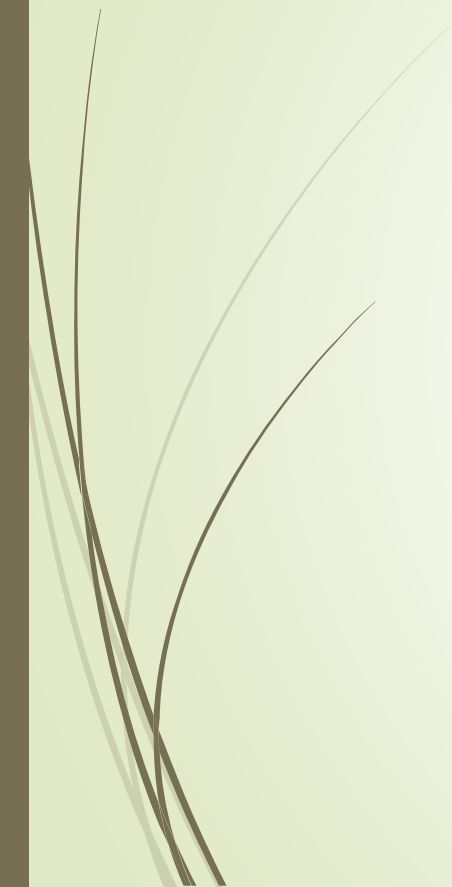


...AND ME!



© DEPOSITPHOTOS
© BRIGHTSIDE







TICK REMOVAL



QUESTION 10

WHERE DO TICKS MOST OFTEN ATTACH?

Generally speaking, ticks are looking for the warmest spaces on your dogs body to latch on - so here are the places you **DEFINITELY** want to keep an eye on:

1 UNDER THE COLLAR

Since dogs collars aren't usually removed, it's possible for a tick to make a little home underneath it without anyone noticing. Make sure to remove your dog's collar from time to time and inspect for ticks.

3 INSIDE OF EARS

If you notice your dog scratching at its ears, ticks could be the cause. All the little crevices inside of an ear make it a popular spot for ticks to hang out.

5 NEAR THE EYELIDS

Is it a skin tag or is it a tick around your dogs eyes? It can truly be difficult to tell, which is why around the eyes is one place ticks go unnoticed. If you're not sure, it's best to consult with a professional.

2 "PRIVATE" AREAS

Near your dogs genitals and perianal area tend to stay warm, making them a popular spot for ticks to latch on.

4 BETWEEN TOES

Ticks are excellent at hiding, so spots like between the toes are cozy and not something that's easy to see - making it a perfect place for a tick to setup camp.

IN AND AROUND
THE EARS

IN AND AROUND
THE HAIR

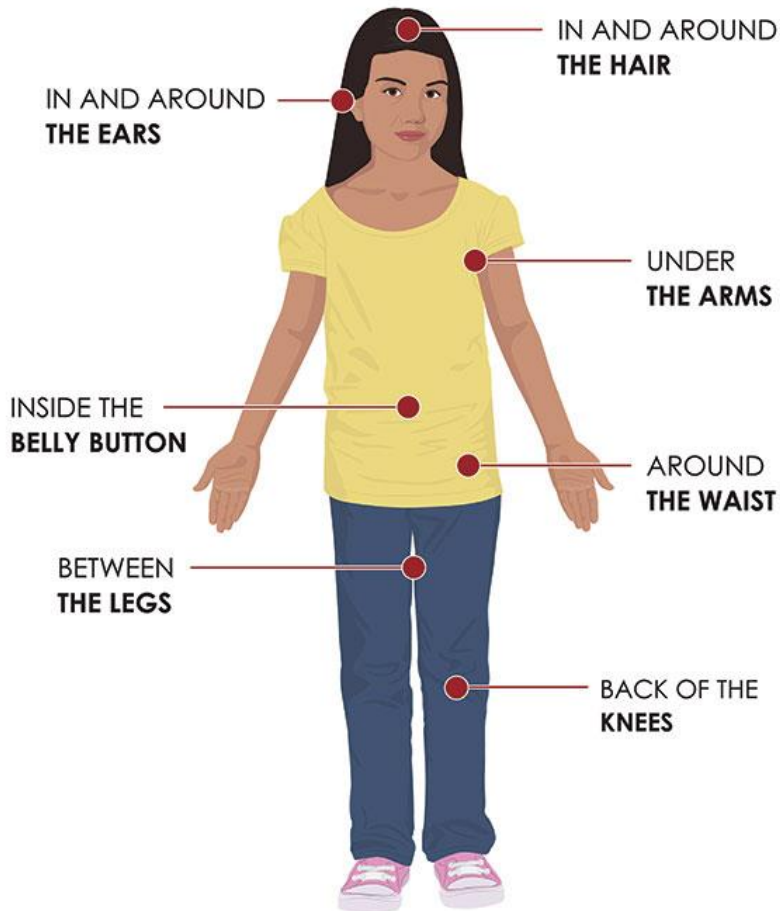
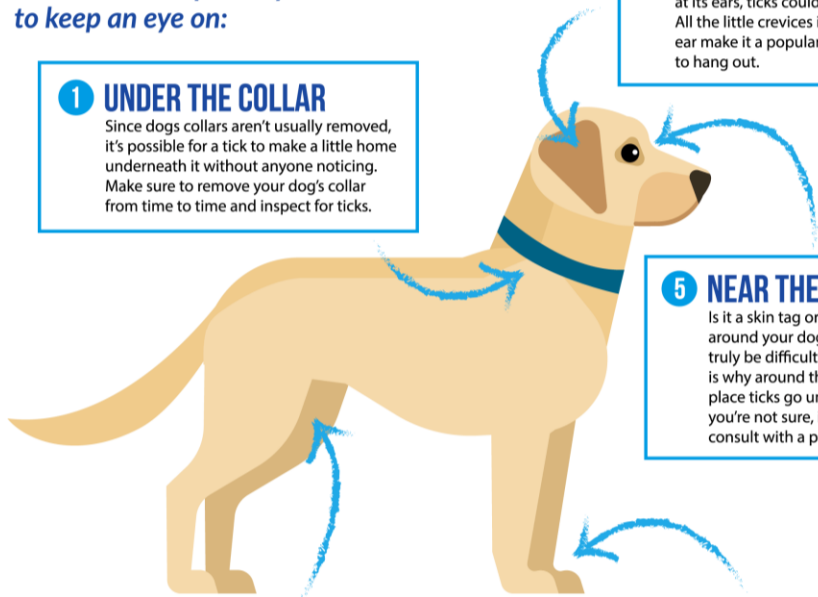
UNDER
THE ARMS

INSIDE THE
BELLY BUTTON

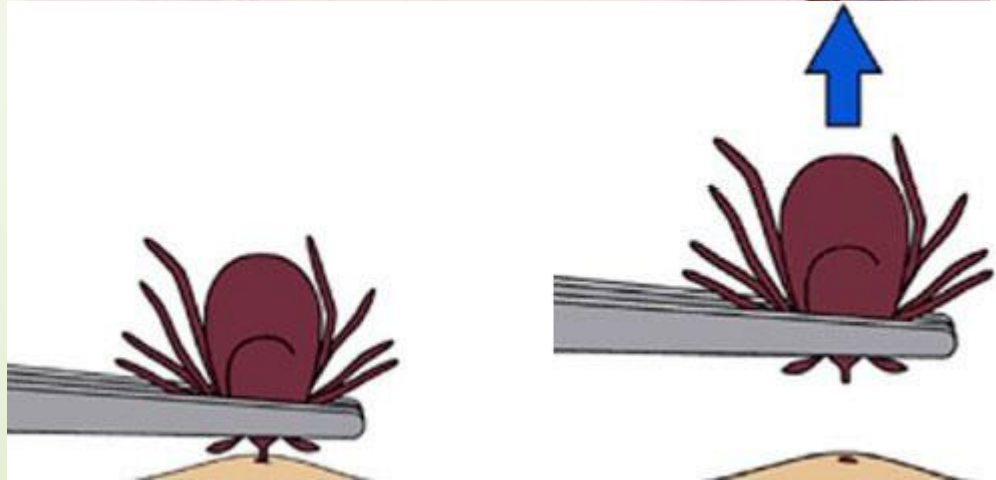
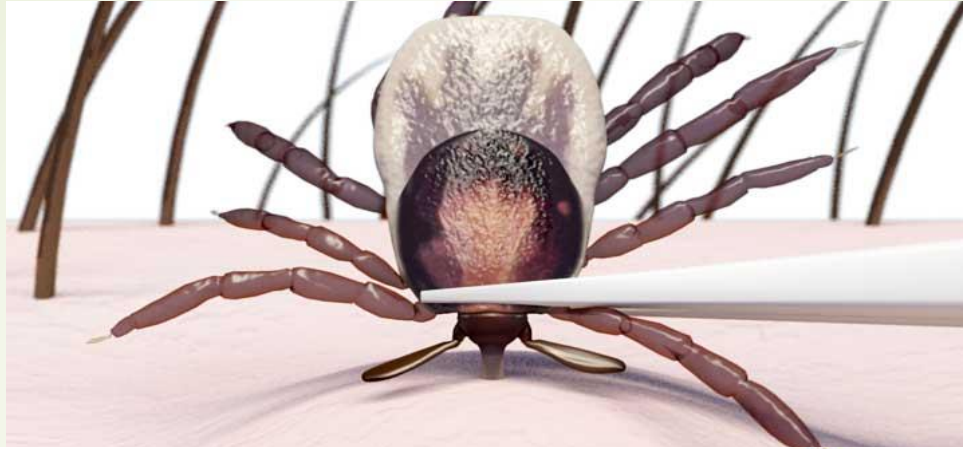
AROUND
THE WAIST

BETWEEN
THE LEGS

BACK OF THE
KNEES



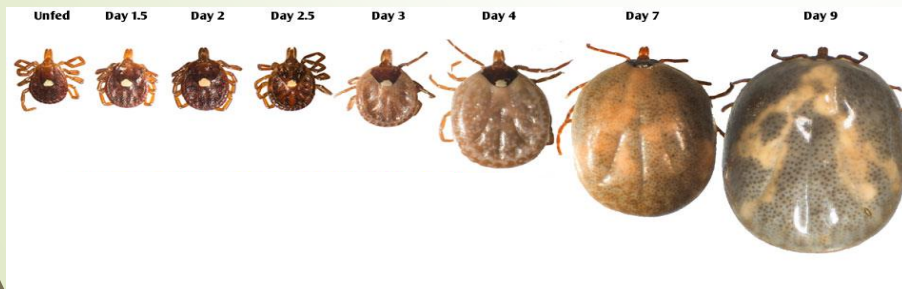
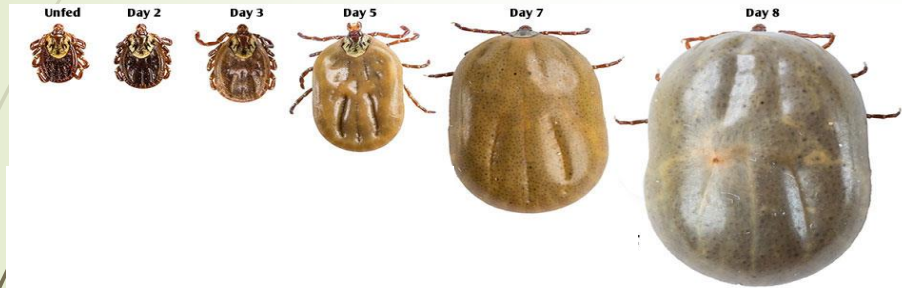
REMOVAL- DO



REMOVAL – DO NOT



IDENTIFYING TICKS AND IF THEY HAVE FED

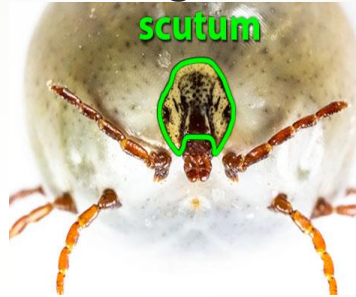


IDENTIFYING TICKS THAT FED

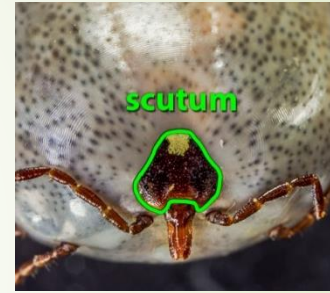
Deer Tick




Dog Tick



Lone Star





BASSETT RESEARCH & NEC RESEARCH

- ▶ Tick bite exposure and disease prevalence in forestry workers in New York State; risk factors and protective measures
- ▶ Tick bite and tick-borne disease exposure in agricultural workers in Vermont and Maine



QUESTION 11



Thank You!

- Please contact me with any questions or comments
 - E-mail: amanda.roome@bassett.org
 - Phone: 607-547-3901



QUESTION 12



QUESTION 13



QUESTION 14



QUESTION 15



QUESTION 16



QUESTION 17



QUESTION 18



QUESTION 19



QUESTION 20



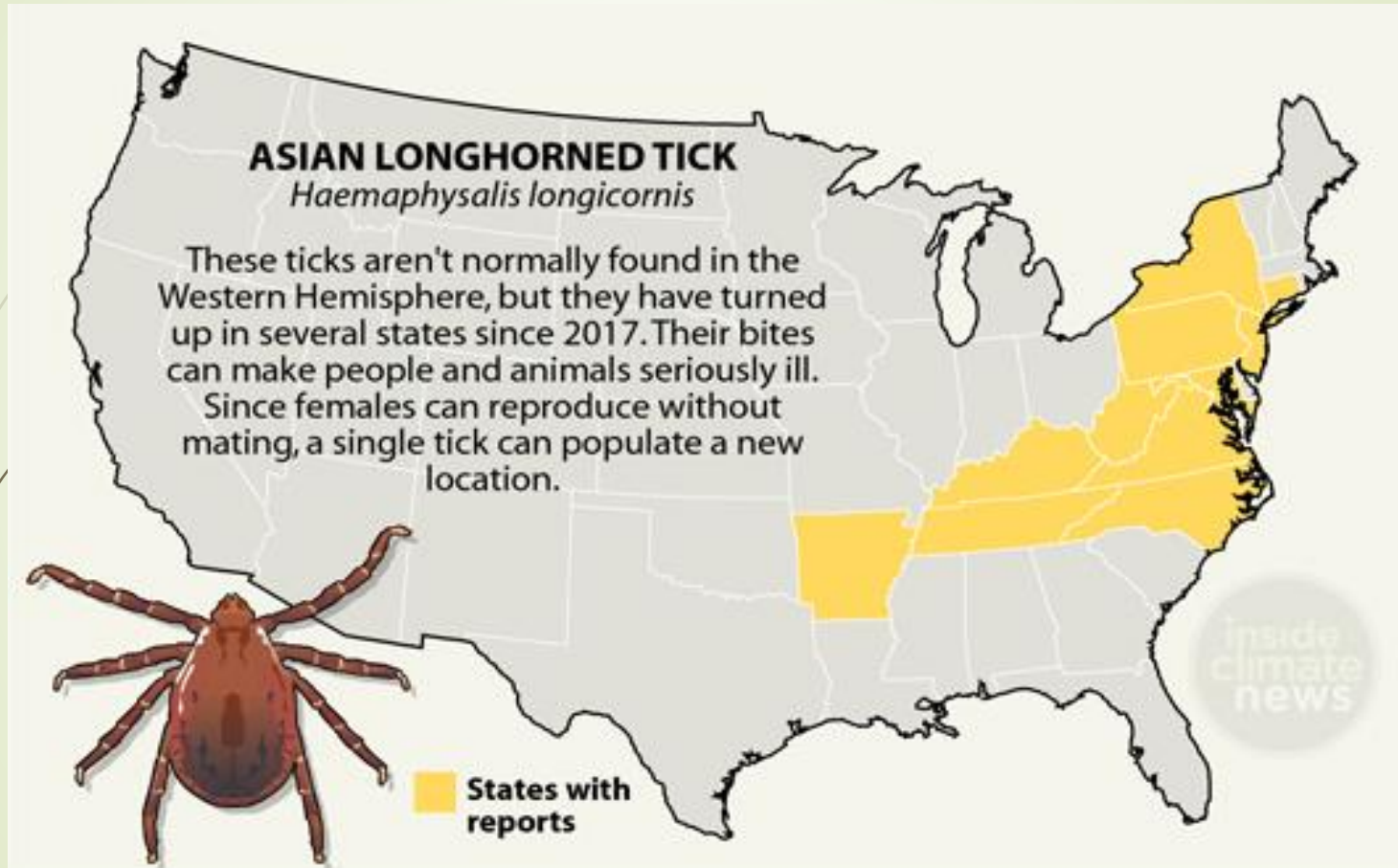
QUESTION 21



Thank You!

- Please contact me with any questions or comments
 - E-mail: amanda.roome@bassett.org
 - Phone: 607-547-3901

NEW TICK ON THE BLOCK



SOURCE: Centers for Disease Control and Prevention

PAUL HORN / InsideClimate News