DEER ISLE ADULT & COMMUNITY EDUCATION

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

MAINE CENTER FOR COASTAL FISHERIES

ISLAND CONNECTIVITY HUB

Ticks & Tick-Borne Diseases: What You Need to Know

Mandy Roome

Outline

- Common ticks/tick-borne diseases in ME
- How ticks/tick-borne diseases have changed (expanded) over time
- How climate change has impacted ticks/tick-borne diseases
- What deer, opossums and household pets have to do with it
- How to prevent tick bites
- How to ID a tick

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Ticks Most Commonly Found in Maine

Ixodes scapularis, Blacklegged/ Deer Tick

- Lyme disease
- Babesiosis
- Anaplasmosis
- Powassan Virus

Dermacentor variablilis, American Dog Tick

- Rocky Mountain Spotted Fever
- Tularemia

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Ticks Most Commonly Found in Maine

Ixodes cookei, Woodchuck/Groundhog Tick

Adult Female

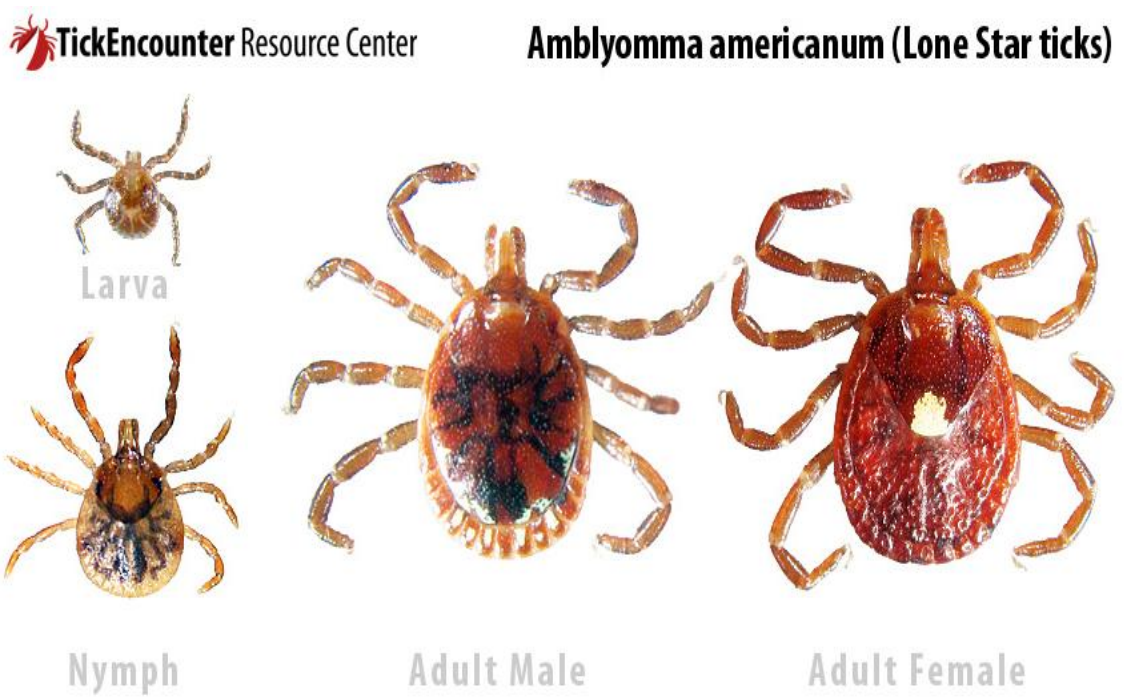
Adult Male

Nymph

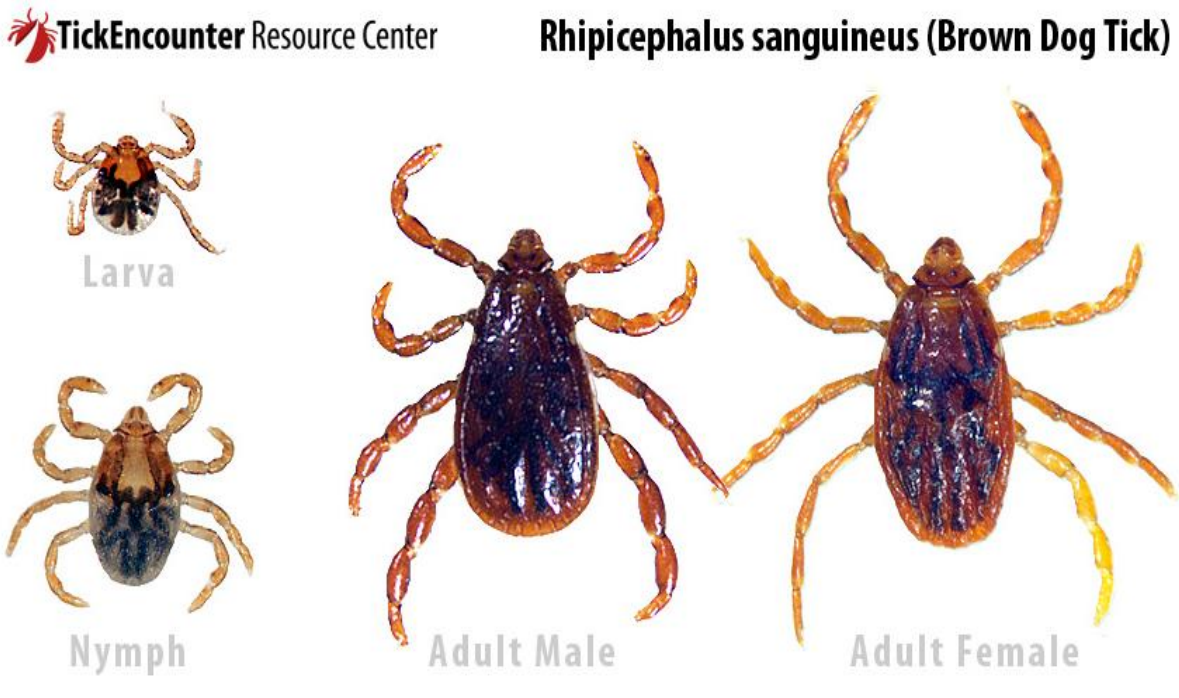
- Powassan Virus

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Other Ticks Found in Maine



- Ehrlichiosis
- Tularemia
- Rocky Mountain spotted fever
- Alpha gal syndrome
- Tick paralysis
- STARI



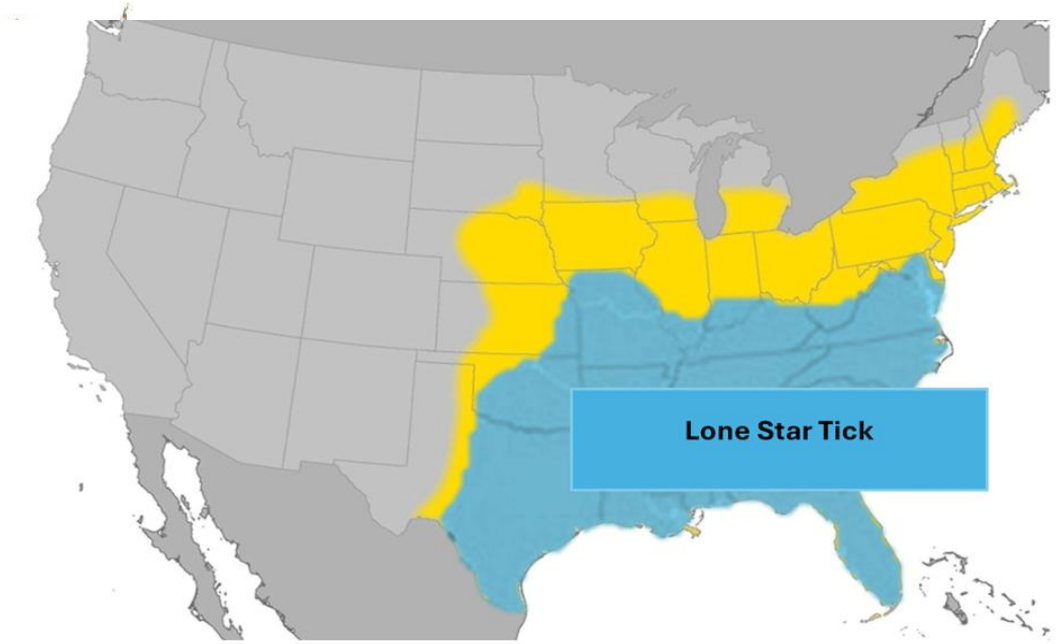
- None known (yet) in the Northeast
- Rocky Mountain Spotted Fever (SW US)

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Other Ticks Found in Maine

TickEncounter Resource Center

Amblyomma americanum (Lone Star ticks)



- Ehrlichiosis
- Tularemia
- Rocky Mountain spotted fever
- Alpha gal syndrome
- Tick paralysis
- STARI

TickEncounter Resource Center

Rhipicephalus sanguineus (Brown Dog Tick)

- None known (yet) in the Northeast
- Rocky Mountain Spotted Fever (SW US)

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Less Common Ticks Found in Maine

- *Amblyomma maculatum,* Gulf Coast Tick; rickettsiosis, tick paralysis

Adult Female

Adult Male

Nymph

- *Ixodes marxi*, Squirrel Tick; Powassan virus

Adult Female

Adult Male

Nymph

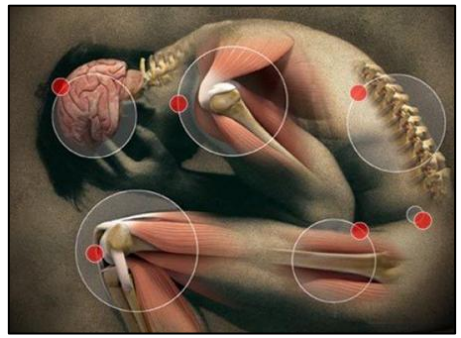
- *Demacentor albipictus*, Winter/Moose Tick; heavy infestations


Winter Tick – Adult Female


Winter Tick – Adult Male


Winter Ticks on Moose

Lyme Disease



- Type of pathogen: bacteria
- Transmission: typically 24-36 hours of tick attachment
- Symptoms: typically 3-30 days after exposure
  - Localized: EM rash (not all cases! Only non-lab confirmation); flu like symptoms
  - Disseminated: flu like symptoms, severe joint pain, bell's palsy, cardiac manifestations, cognitive difficulties
  - Persisting Late Stage: persistent joint pain & swelling, neurologic/cognitive dysfunction, nervous system disorders (pain/tingling)

Chronic Lyme Disease

- CDC recognizes 10-20% of people who have been treated for Lyme continue to have persistent symptoms
- 3 Main areas affected: Joints, Nervous System, Skin
- Chronic Lyme disease is *not* recognized by the Infectious Disease Society of America
- The mechanism is uknown (Lyme bacteria? Autoimmune condition?)
- In addition to severe illness
  - Relapsing symptoms
  - Financial strain (insurance coverage)
  - Inability to work
  - Marital/relationship strain
  - Gaslighting (medical or other

Anaplasmosis

- Type of pathogen: bacteria
- Transmission: typically 24 hours of tick attachment
- Symptoms: Fever, chills, headache, muscle pain, fatigue, gastrointestinal symptoms (loss of appetite, nausea, vomiting, diarrhea)
  - Symptom onset: typically 5-14 days after exposure
- Also associated with blood product transfusions
- If left untreated, can (in rare cases) be fatal

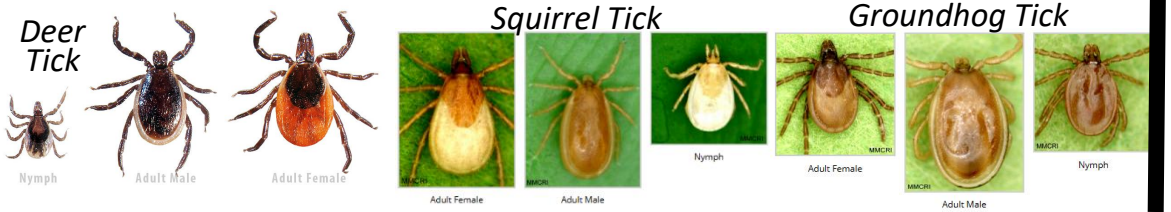
Babesiosis

- Type of pathogen: parasite
- Transmission: typically 36-48 hours of tick attachment
- Symptoms: Fever, chills, sweats, muscle pain, fatigue, headache, loss of appetite, nausea, dark urine
  - Symptom onset: typically 1-9 weeks after exposure
- Also associated with blood transfusions/organ transplants (2018- screen blood donations)
  - Severe cases can be life threatening, but some cases may be asymptomatic and not require treatment

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Powassan Virus

- Type of pathogen: virus
- Transmission: can transmit within 15 min of tick attachment
- Symptoms: fever, headache, vomiting, weakness. Can progress to meningo encephalitis
  - Symptom onset: typically 1-4 weeks after exposure
- Severe cases can be fatal, mild cases can resolve on their own

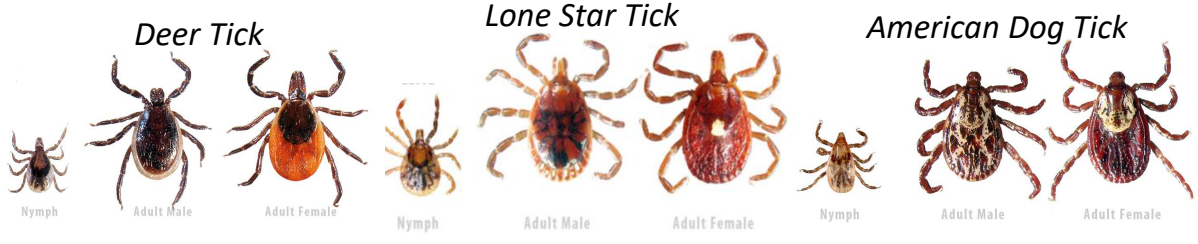


Rocky Mountain Spotted Fever

- Type of pathogen: bacteria
- Transmission: can be within 4-6 hours of tick attachment
- Symptoms: typically 3-12 days after exposure
  - Early (Days 1-4): high fever, headache, joint pain, fatigue, edema around eyes/back of hands (90% of cases), nausea, vomiting, loss of appetite
  - Late (Day 5+): altered mental status, coma, cerebral edema, respiratory problems, necrosis, multiorgan system failure

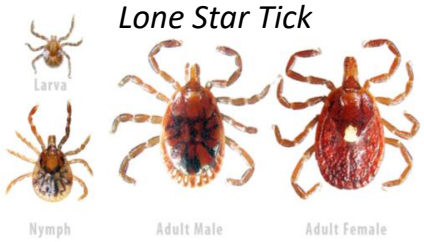
Ehrlichiosis

- Type of pathogen: bacteria
- Transmission: typically 12-24 hours of tick attachment
- Symptoms: fever, chills, headache, fatigue, muscle pain, nausea, vomiting, diarrhea, loss of appetite, altered mental status, rash (more common in children)
  - Symptom onset: typically 5-14 days after exposure
- Incidence generally increases with age



Alpha Gal Syndrome

- Type of pathogen: sugar molecule (found in most mammals [not humans] and Old World monkeys)
- Transmission: no minimum attachment time (as soon as saliva is injected into skin)
- Symptoms: allergic reaction to alpha gal. Hives, swelling, itching, nausea, vomiting, diarrhea, abdominal pain, chest tightness, dizziness, anaphylaxis (rare).
  - Symptom onset: typically 4-6 weeks after initial bite; 3-8 hours after exposure to alpha gal (red meat, dairy, etc.)
- Re-exposure can increase alpha-gal IgE levels, making the allergy more severe. May also be spread by the deer tick
- Alpha gal is found in: red meat (beef, pork, lamb, venison, rabbit, goat, organ meats), diary, gelatin (foods, medications, cosmetics), some vaccines (mammalian cells), some medications

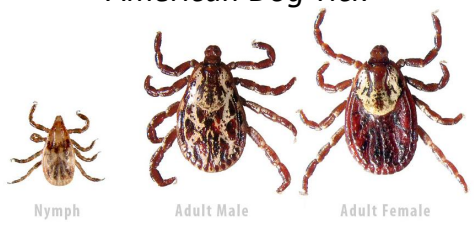


Tularemia

- Type of pathogen: bacteria
- Transmission: typically 24 hours of tick attachment
- Symptoms: fever, chills, headache, fatigue, loss of appetite, muscle aches, cough/chest pain, sore throat, abdominal pain, vomiting, diarrhea
  - Symptom onset: typically 3-5 days after exposure
- Clinical manifestations will vary based on the route of inoculation (tick bite, deer fly bite, inhalation, ingestion, skin contact with infected animals)

Lone Star Tick

American Dog Tick



Tick Paralysis

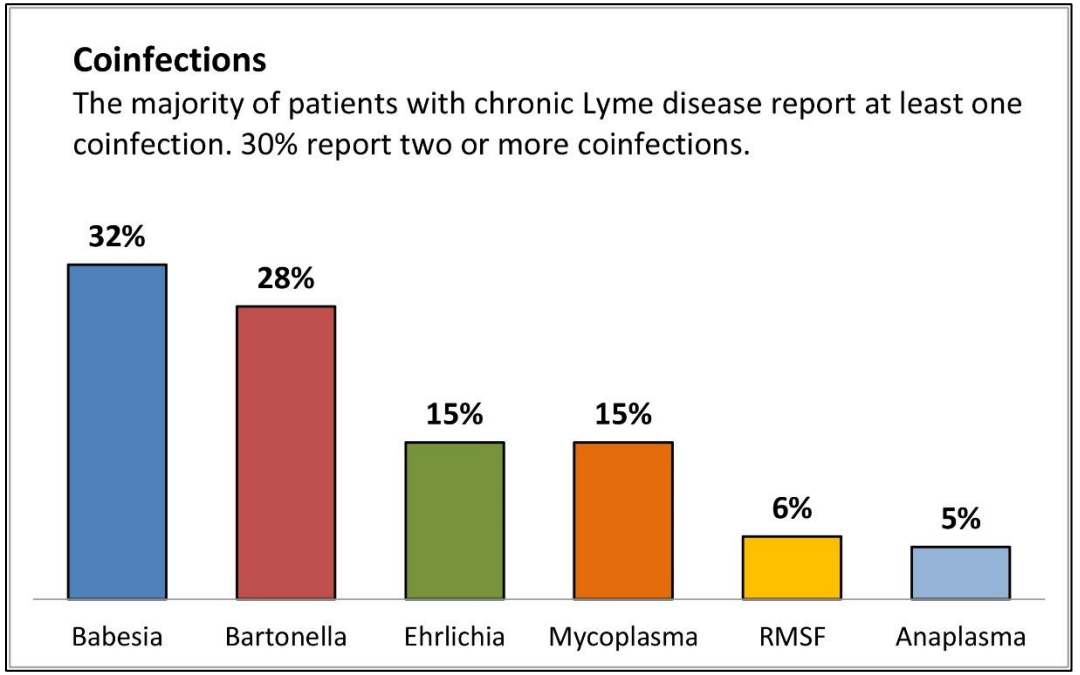
- Type of pathogen: neurotoxin (rare) in the saliva of a tick
- Transmission: typically 24 hours of tick attachment
- Symptoms: weakness/paralysis starting in the legs spreading upwards, difficulty walking/standing, slurred speech, difficulty swallowing, respiratory problems, facial paralysis
  - Symptom onset: typically 5-7 days after exposure
- Symptoms similar to Guillain-Barre syndrome. When the tick is removed, symptoms will improve within a few days.

Lone Star Tick

Gulf Coast Tick

Co-Infections

- A single tick can transmit more than one pathogen if they are carrying more than one
- Co-infections can lead to more severe, prolonged or complex symptoms. Diagnosis can be difficult
- A co-infection may require a more complex treatment plan



Testing a tick after a bite

- There are many places you can mail a tick to for pathogen testing if you are bitten
  - The University of Maine Cooperative Extension Tick Lab
  - Tick Check
  - Ticknology
  - IGenex
  - Among others
- There are pros and cons to tick testing
  - Pros
    - Peace of mind if it's negative
    - Knowing what symptoms to look out for if it's positive
  - Cons
    - A positive tick does NOT mean disease transmission occurred

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Testing yourself after a bite: what to ask for

Tick Bite Prophylaxis

- 1 time dose of 200mg doxycycline (adults not pregnant, children over 8 [at 4mg/kg])
- Criteria
  - Doxycycline isn't contraindicated
  - The tick is a deer tick
  - Estimated time of attachment is >36 hours
  - Prophylaxis can be started within 72 hours of tick removal
  - You live in an endemic county/state (all of New England is included)

Illness Testing

- Talk to your doctor about a tick panel (tests for multiple tick-borne diseases, not just Lyme- catch co-infections)
- Testing cannot happen right after a bite. Several of the test are for antibodies and your immune system needs time to mount a response (usually at least 2 weeks)
- PCR testing (direct bacterial detection) vs. antibody testing (your immune systems response)

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

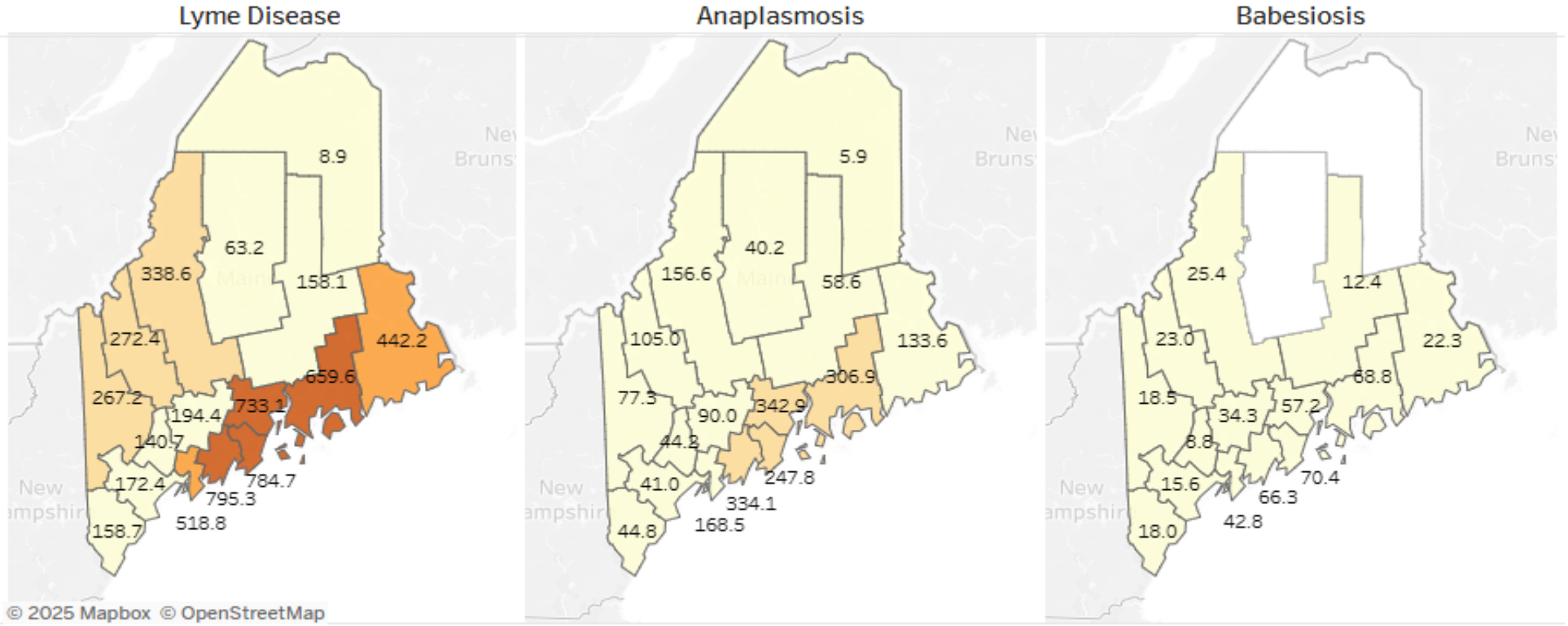
Cases of Tickborne Diseases, Maine 2025

Lyme Disease	Anaplasmosis	Babesiosis
3,565	1,285	328

This is the total year-to-date number of case reports as of October 21. Data shown are preliminary and subject to change.

Topic: (All) | Measure: Rate (per 100,000) | Display: Maps | Data Labels (Maps/Charts): On

Rate of Tickborne Diseases by County, 2025 Year-to-date, as of October 21



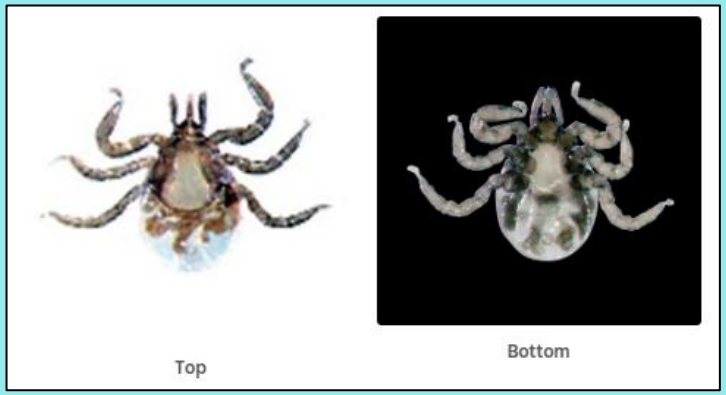
Rate (per 100,000)

5.9 — 795.3

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

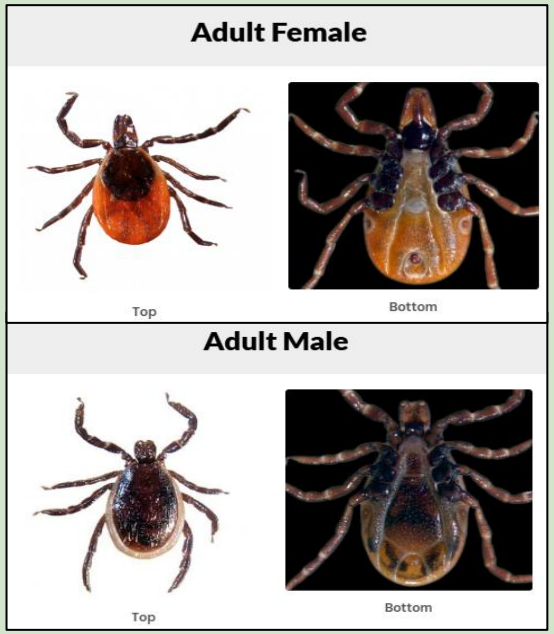
Life Cycle of a Deer Tick

- **Larvae**
  - Blood meal (reservoir host- white footed mice)
  - Molt

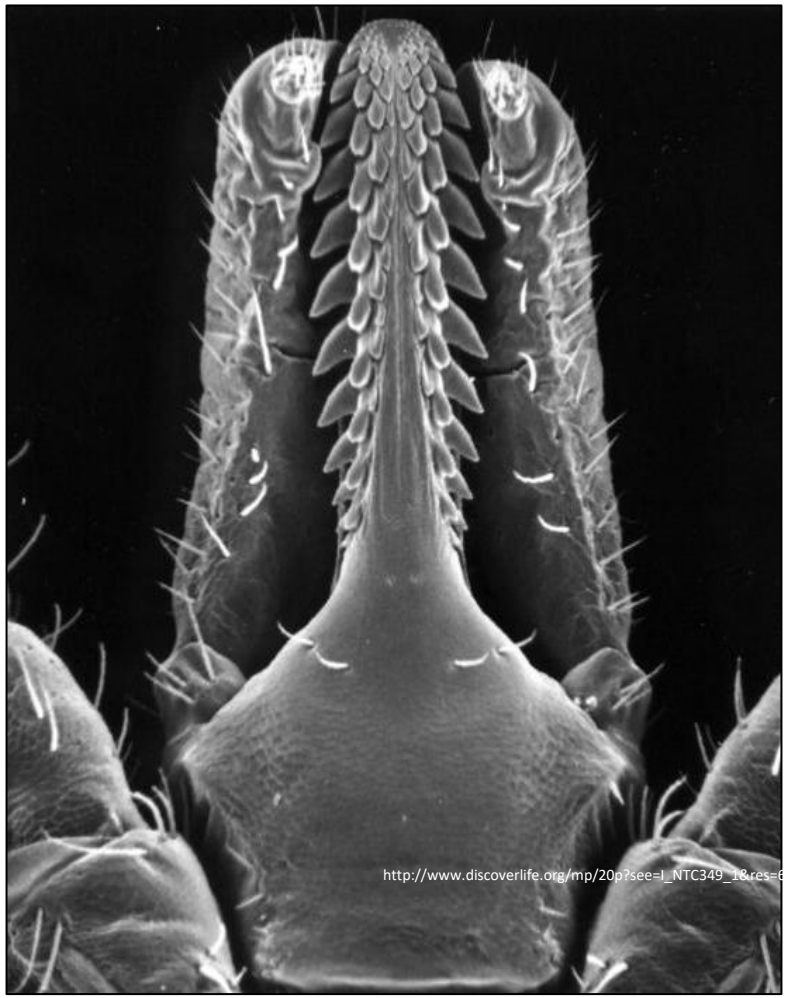


- **Nymphs**
  - Most likely to infect humans
  - Blood meal (spirochete transmission)
  - Molt

- **Adults**
  - Blood meal (spirochete transmission)
  - Mate (on host)
  - Males die
  - Females lay eggs (~1200) and die

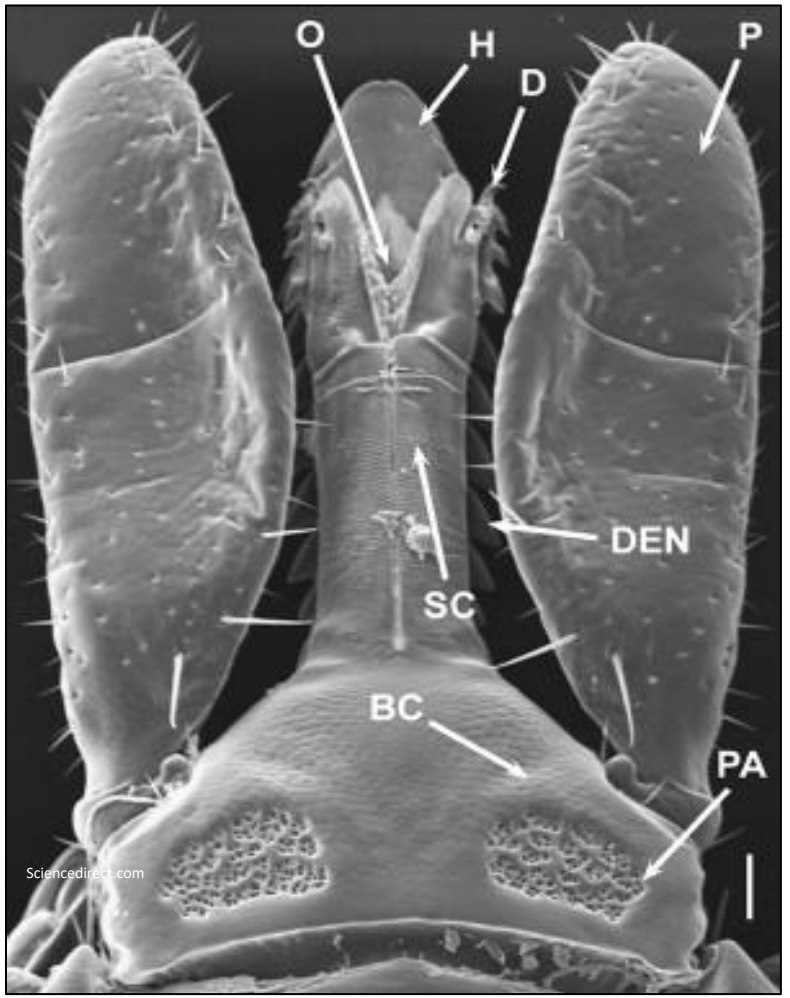


Deer Tick Feeding



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

Anderson et. al 2008



NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Reported Cases of Lyme Disease -- United States, 2001

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

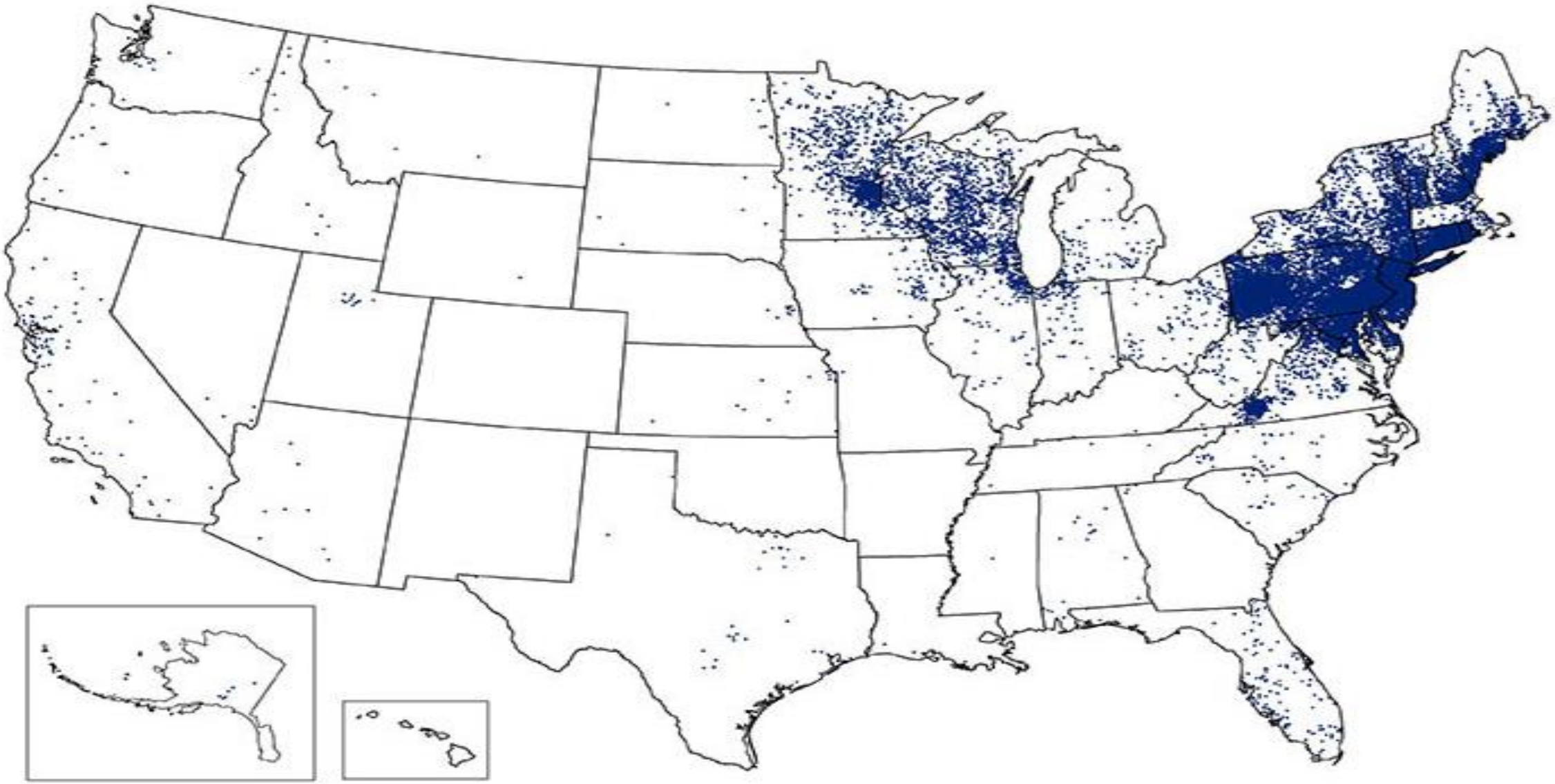
Reported Cases of Lyme Disease -- United States, 2006

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

Reported Cases of Lyme Disease -- United States, 2011

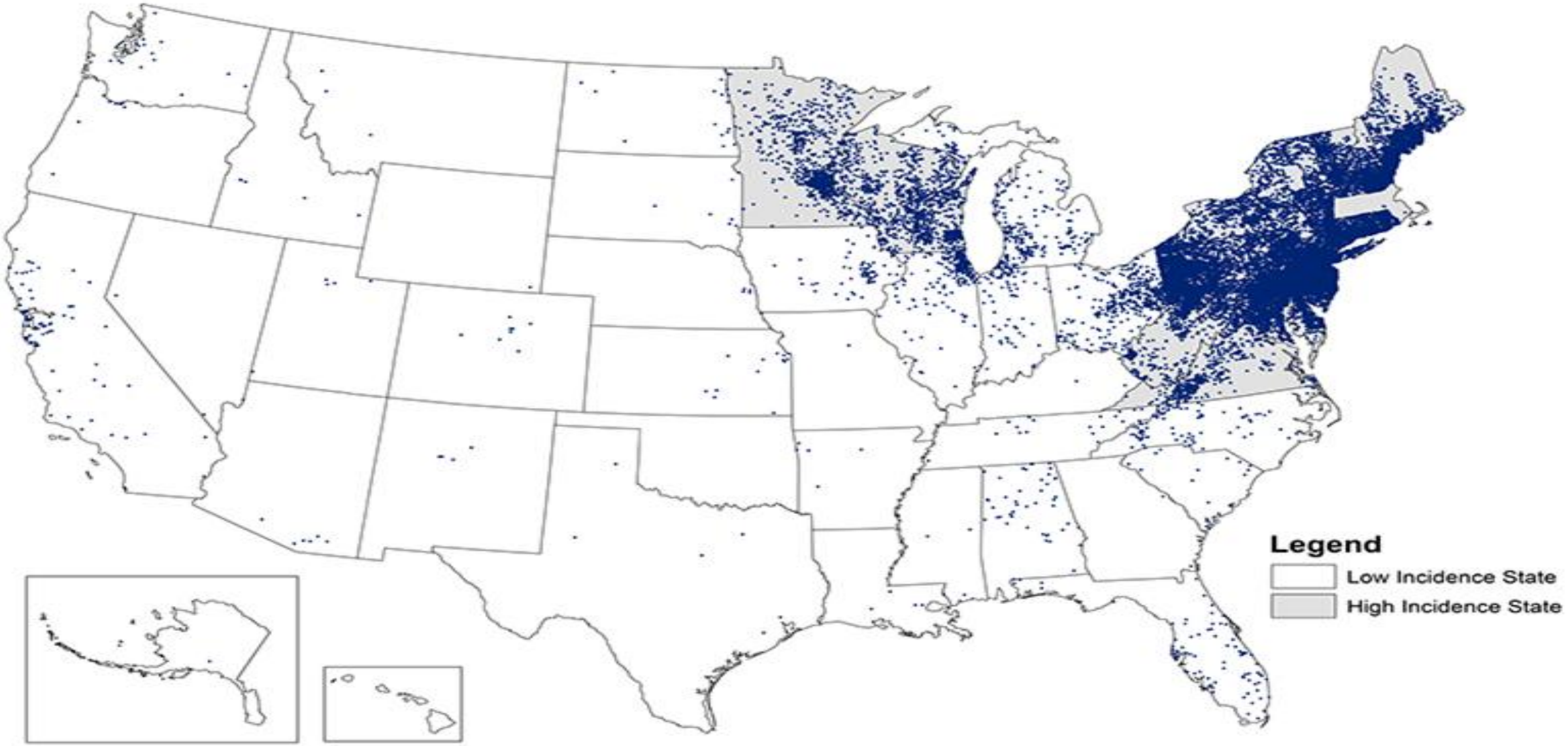
1 dot placed randomly within county of residence for each confirmed case

Reported Cases of Lyme Disease – United States, 2016



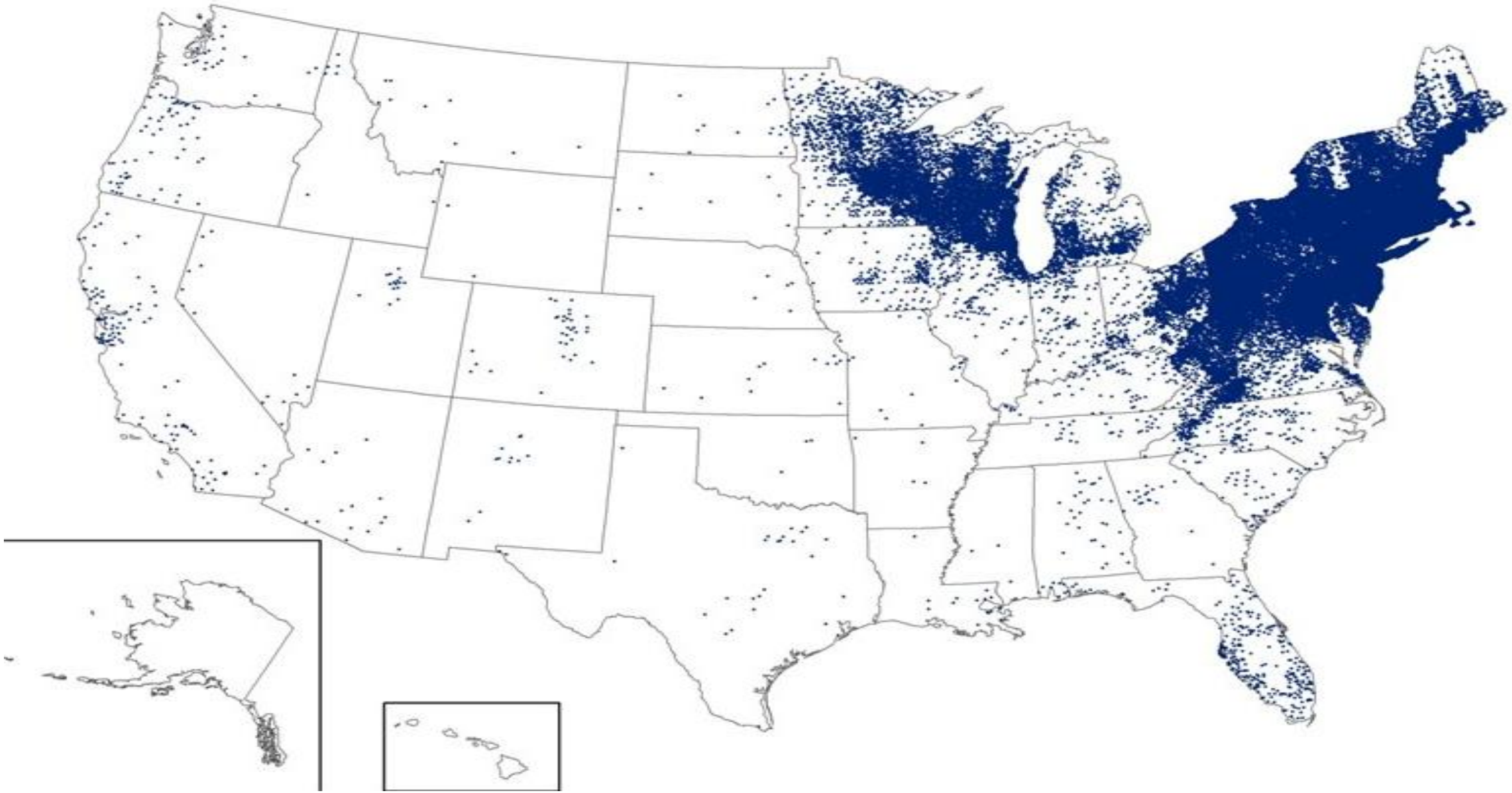
1 dot placed randomly within county of residence for each confirmed case

Reported Cases of Lyme Disease — United States, 2019

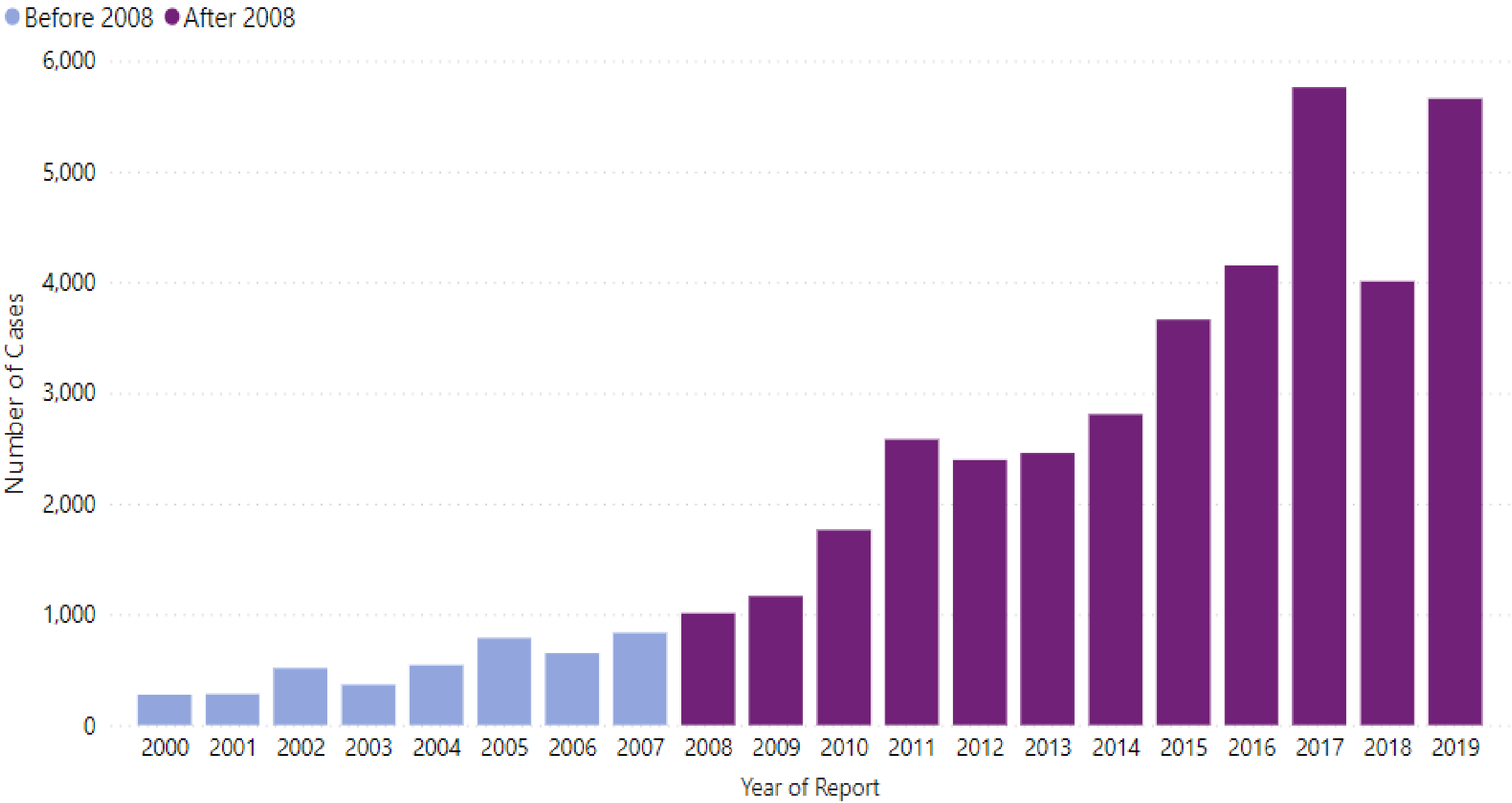


1 dot placed randomly within county of residence for each confirmed case

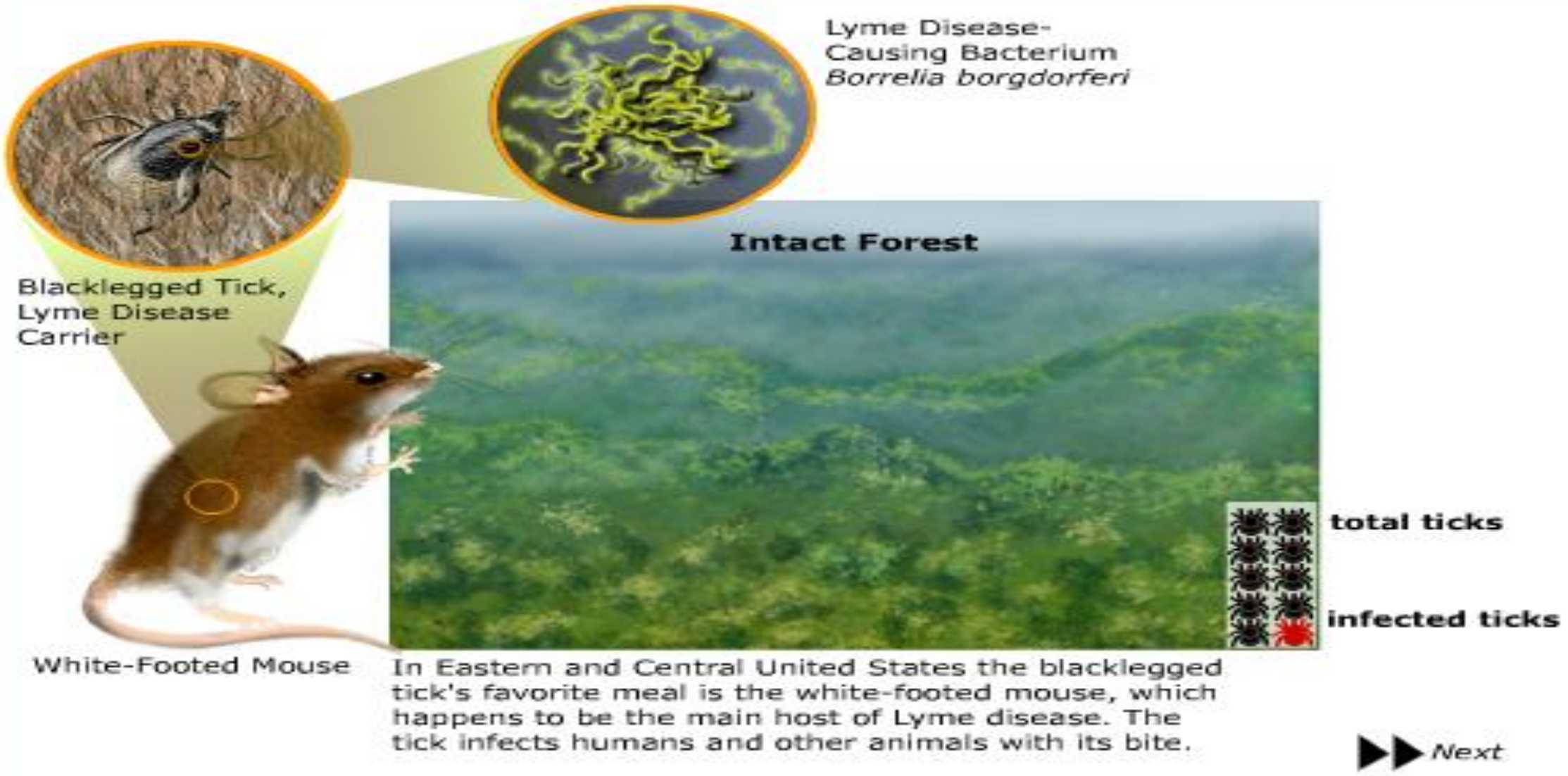
Reported Cases of Lyme Disease — United States, 2023



Number of reported cases of anaplasmosis –United States, 2000–2019

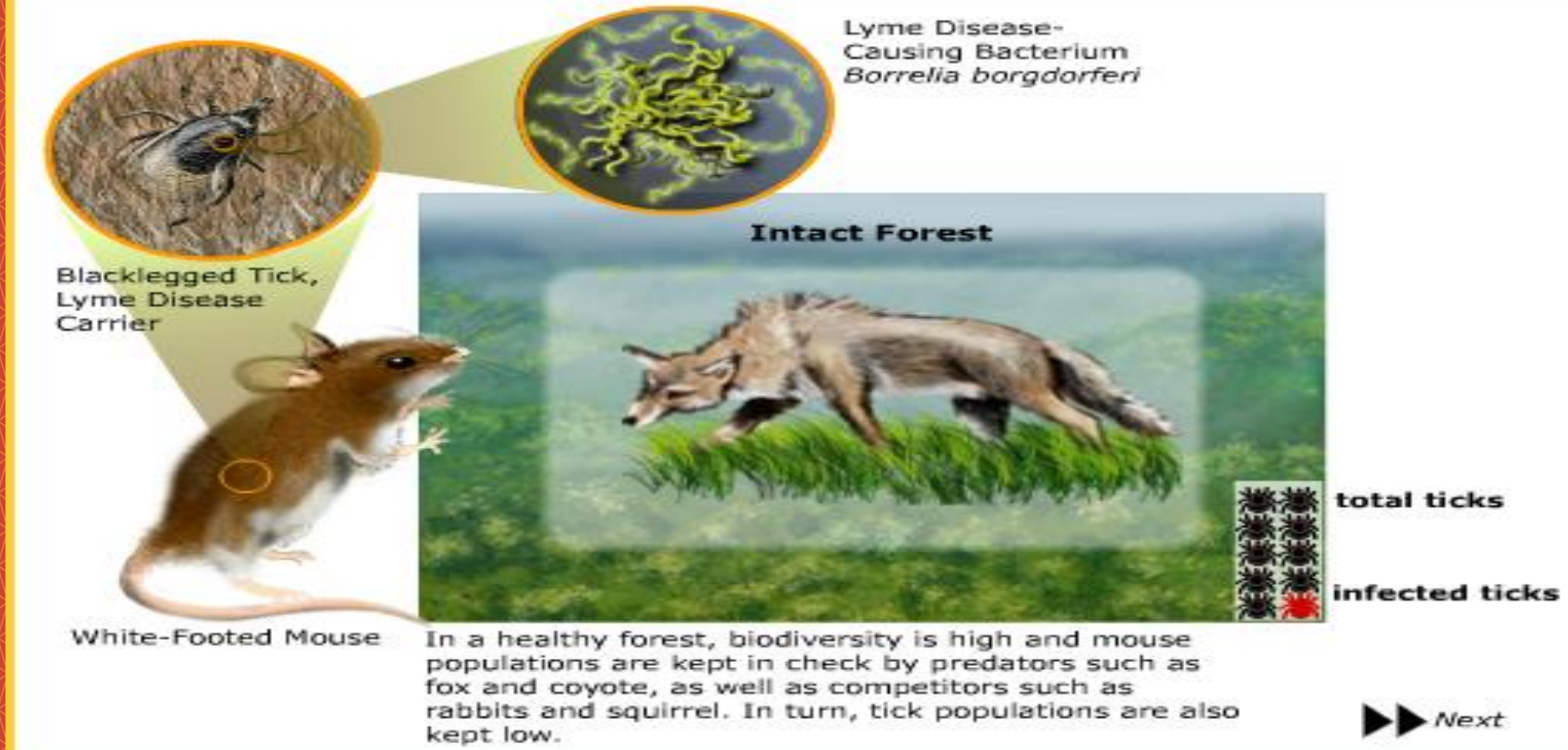


Land Use



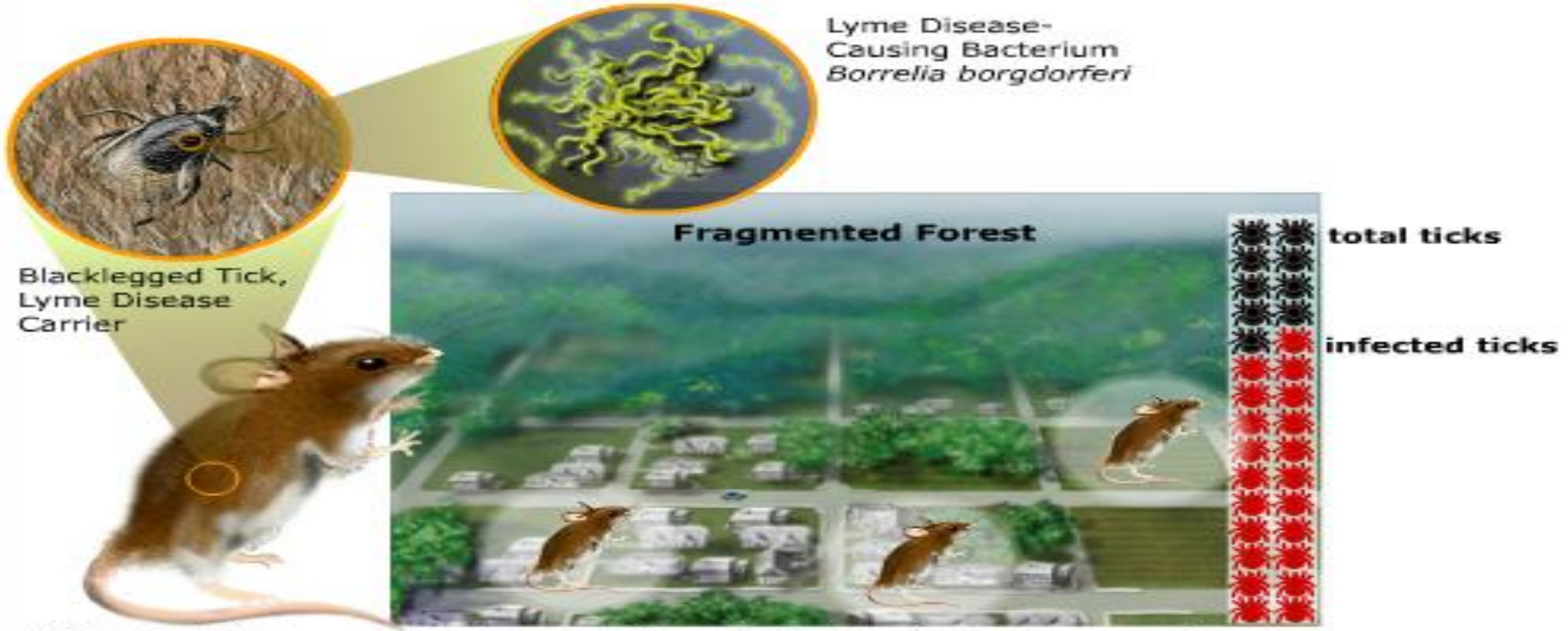
Credit: Nicolle Rager, National Science Foundation

http://www.nsf.gov/news/special_reports/ecoinf/lyme.jsp



Credit: Nicolle Rager, National Science Foundation

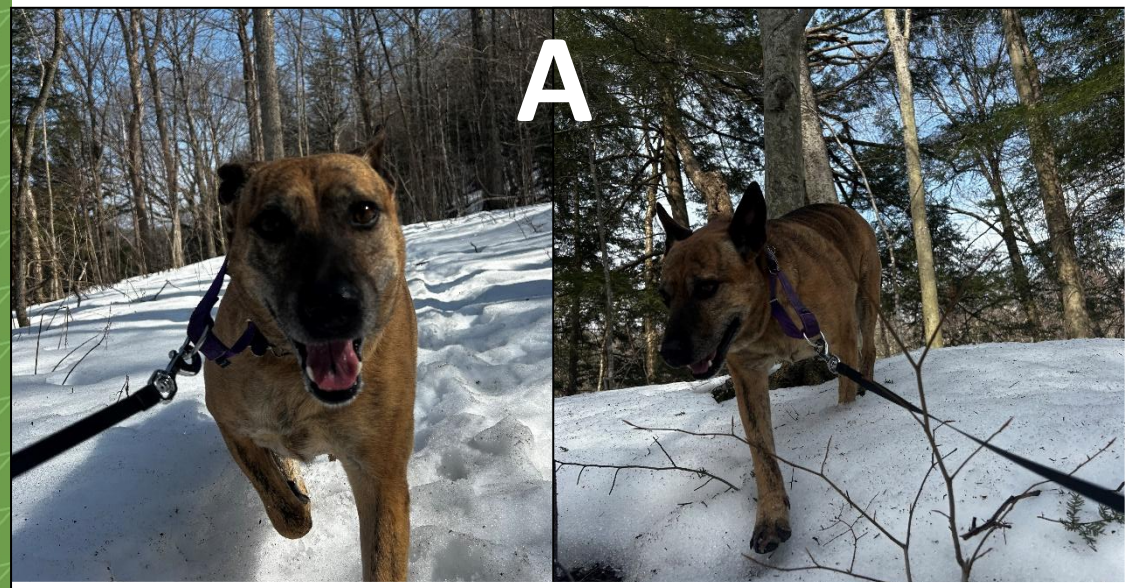
http://www.nsf.gov/news/special_reports/ecoinf/lyme.jsp

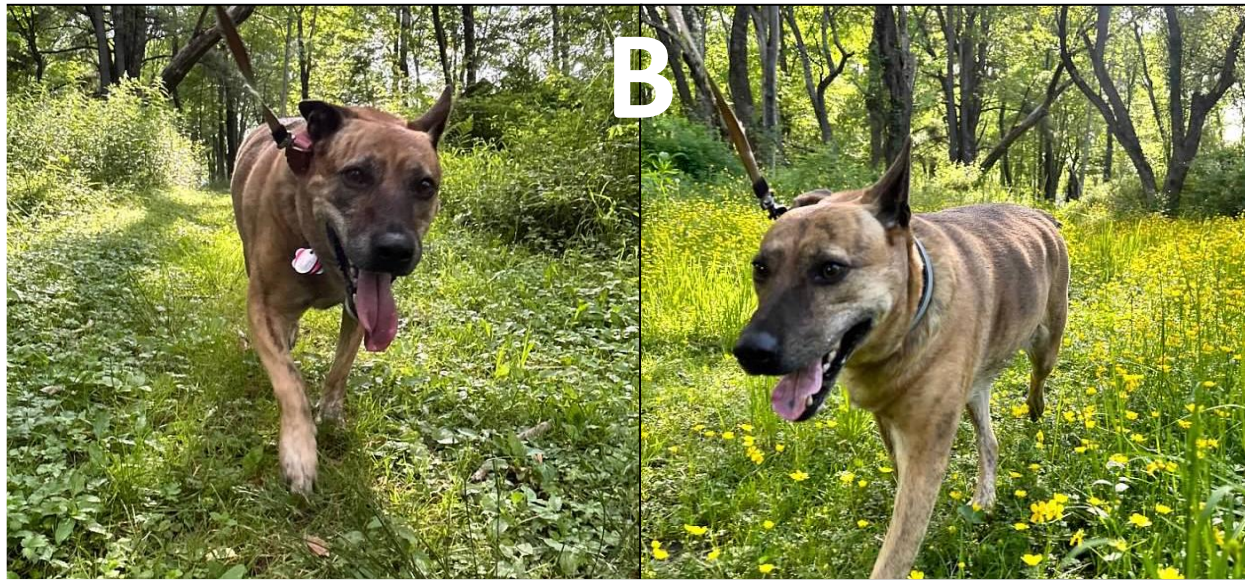


Credit: Nicolle Rager, National Science Foundation

http://www.nsf.gov/news/special_reports/ecoinf/lyme.jsp

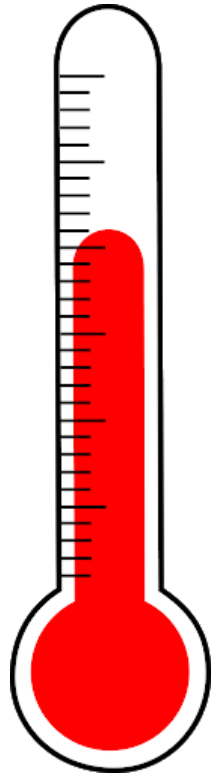
When are ticks active?





When are ticks active?

ANY TIME TEMPERATURES ARE ABOVE 39 DEGREES!! (most active above 45)



NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

The Impact of Climate Change

- Longer questing/activity periods
  - Mid-winter thaws; milder winters
  - Earlier spring, later fall
- Increased survival rates
  - Exotic species establishing themselves in the US (Asian longhorned tick)
  - More heat tolerant phenotypes (Africa)
- Geographic expansion
  - Ticks moving further north/higher altitudes
  - Bird migration

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

WHAT ROLE DO DEER PLAY?

Table 1. Adult female and male deer ticks (1470 ticks) tested for *Borrelia burgdorferi* in Broome and Chenango Counties, New York State, U.S.A., collected at deer-processing centres and by the dragging method from June 2012 to November 2013.

County	Method of collection	Adult female ticks tested, *n*	Ticks positive for *B. burgdorferi*, %	Adult male ticks tested, *n*	Ticks positive for *B. burgdorferi*, %
Broome	Deer	139	1.4	234	1.7
	Dragging	460	43.3	396	37.9
Chenango	Deer	32	3.1	132	6.8
	Dragging	38	55.3	39	38.5

Table 2. Adult female and male deer ticks (537 ticks) tested for *Borrelia burgdorferi* attached and unattached to the deer host collected in Broome and Chenango Counties during November 2012 and 2013.

County	Method of collection	Adult female ticks tested, *n*	Ticks positive for *B. burgdorferi*, %	Adult male ticks tested, *n*	Ticks positive for *B. burgdorferi*, %
Broome	Attached	108	0.0	13	0.0
	Unattached	31	6.5	221	1.8
Chenango	Attached	24	0.0	3	0.0
	Unattached	8	12.5	129	7.0

WHAT ROLE DO DEER PLAY?

Table 1. Adult female and male deer ticks (1470 ticks) tested for *Borrelia burgdorferi* in Broome and Chenango Counties, New York State, U.S.A., collected at deer-processing centres and by the dragging method from June 2012 to November 2013.

County	Method of collection	Adult female ticks tested, *n*	Ticks positive for *B. burgdorferi*, %	Adult male ticks tested, *n*	Ticks positive for *B. burgdorferi*, %
Broome	Deer	139	1.4	234	1.7
	Dragging	460	43.3	396	37.9
Chenango	Deer	32	3.1	132	6.8
	Dragging	38	55.3	39	38.5

Table 2. Adult female and male deer ticks (537 ticks) tested for *Borrelia burgdorferi* attached and unattached to the deer host collected in Broome and Chenango Counties during November 2012 and 2013.

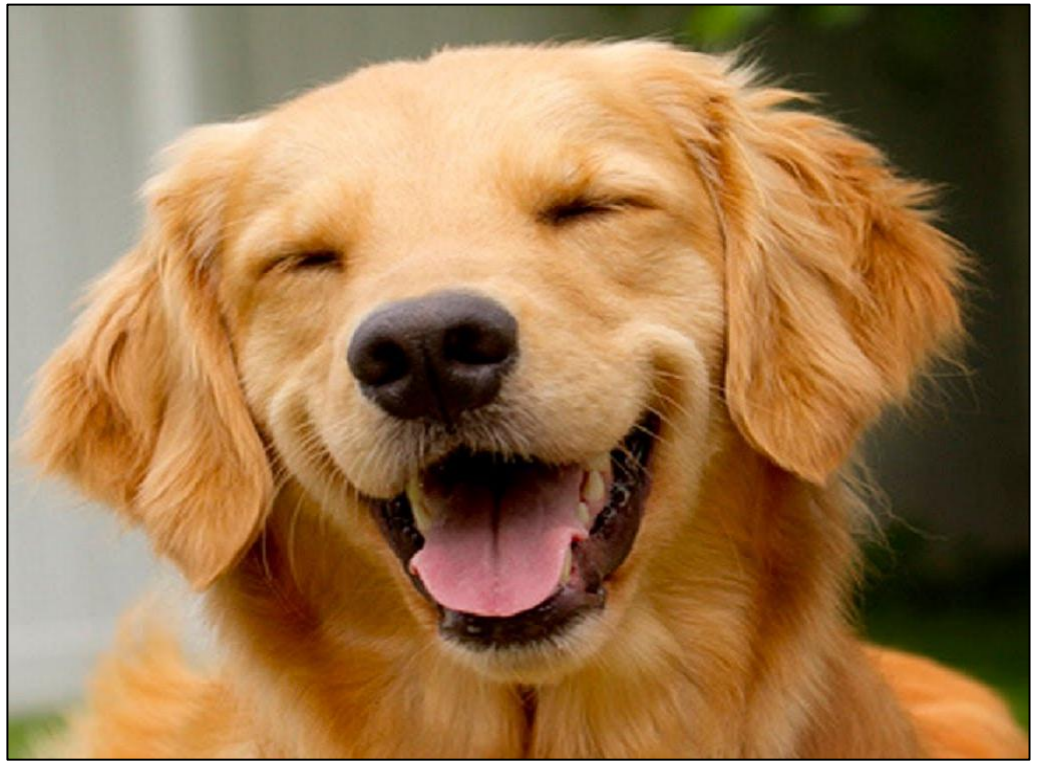
County	Method of collection	Adult female ticks tested, *n*	Ticks positive for *B. burgdorferi*, %	Adult male ticks tested, *n*	Ticks positive for *B. burgdorferi*, %
Broome	Attached	108	0.0	13	0.0
	Unattached	31	6.5	221	1.8
Chenango	Attached	24	0.0	3	0.0
	Unattached	8	12.5	129	7.0

What Role Do Opossums Play?

- Opossums kill about 90% of ticks that attempt to feed on them
- Excellent groomers!
- Estimated that one opossum can kill about 5,000 ticks in one season
- Appreciate the opossums ☺

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Household Pets



Dog Data		
Blood Tested	Blood Positive for B. burgdorferi	% Positive for B. burgdorferi
362	124	34.4

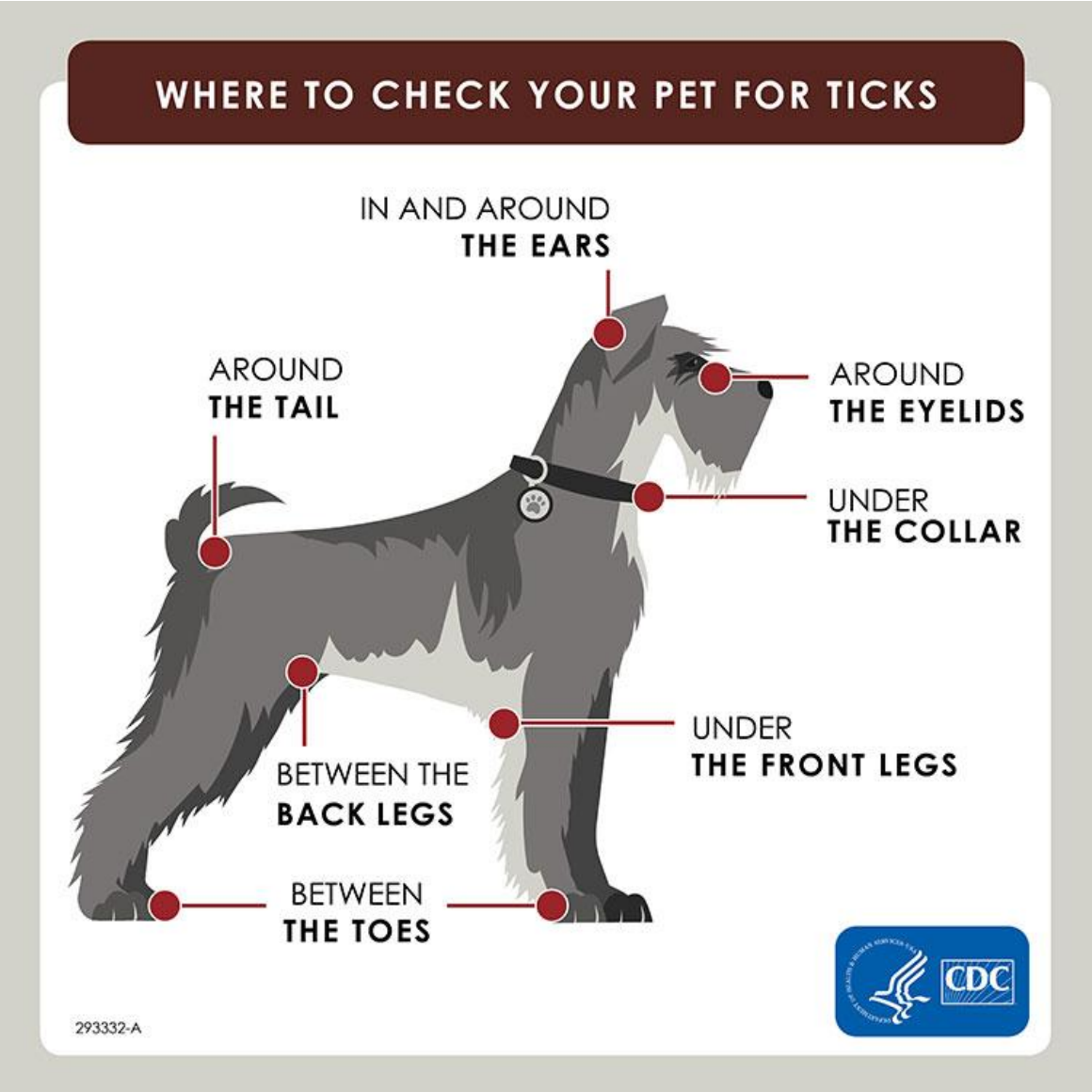
NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Household Pets

- Pet ownership (any kind) associated with 11.1% increase in probability of LD (p=0.038).
- Effect limited to cat owners (p=0.007; dog owners p=0.221)
- Rural living associated with a 36% increase in probability of LD

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

How do we protect our pets?

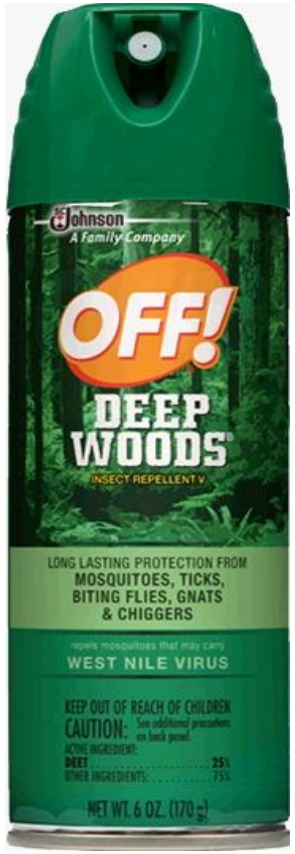


- Lyme vaccine for dogs
- Tick preventives
  - Treated collars
  - Oral treatment
  - Flea/tick treatments
- Lint roller after outdoor activity
- Tick checks

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Tick Bite Prevention

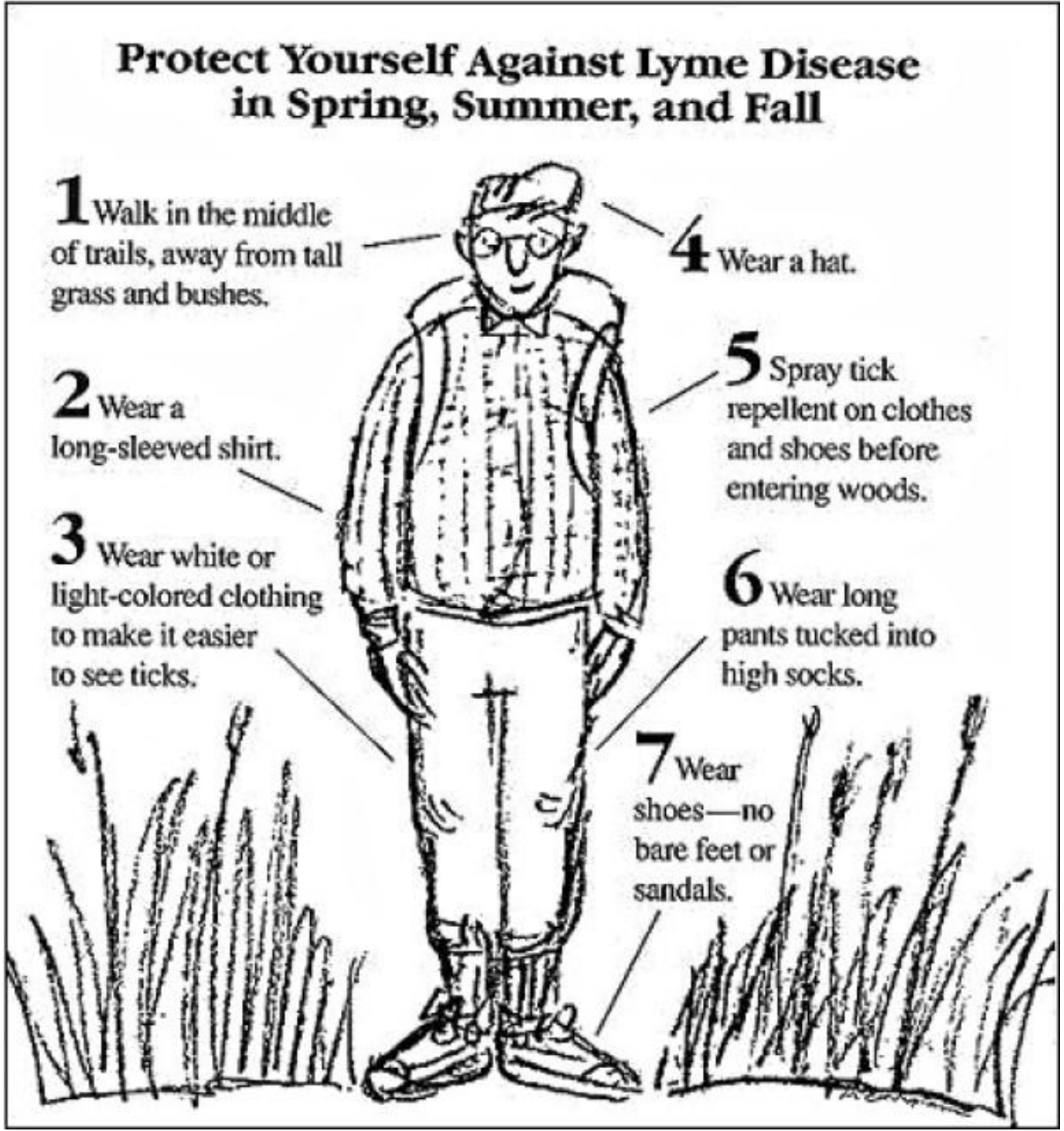
Chemical Control



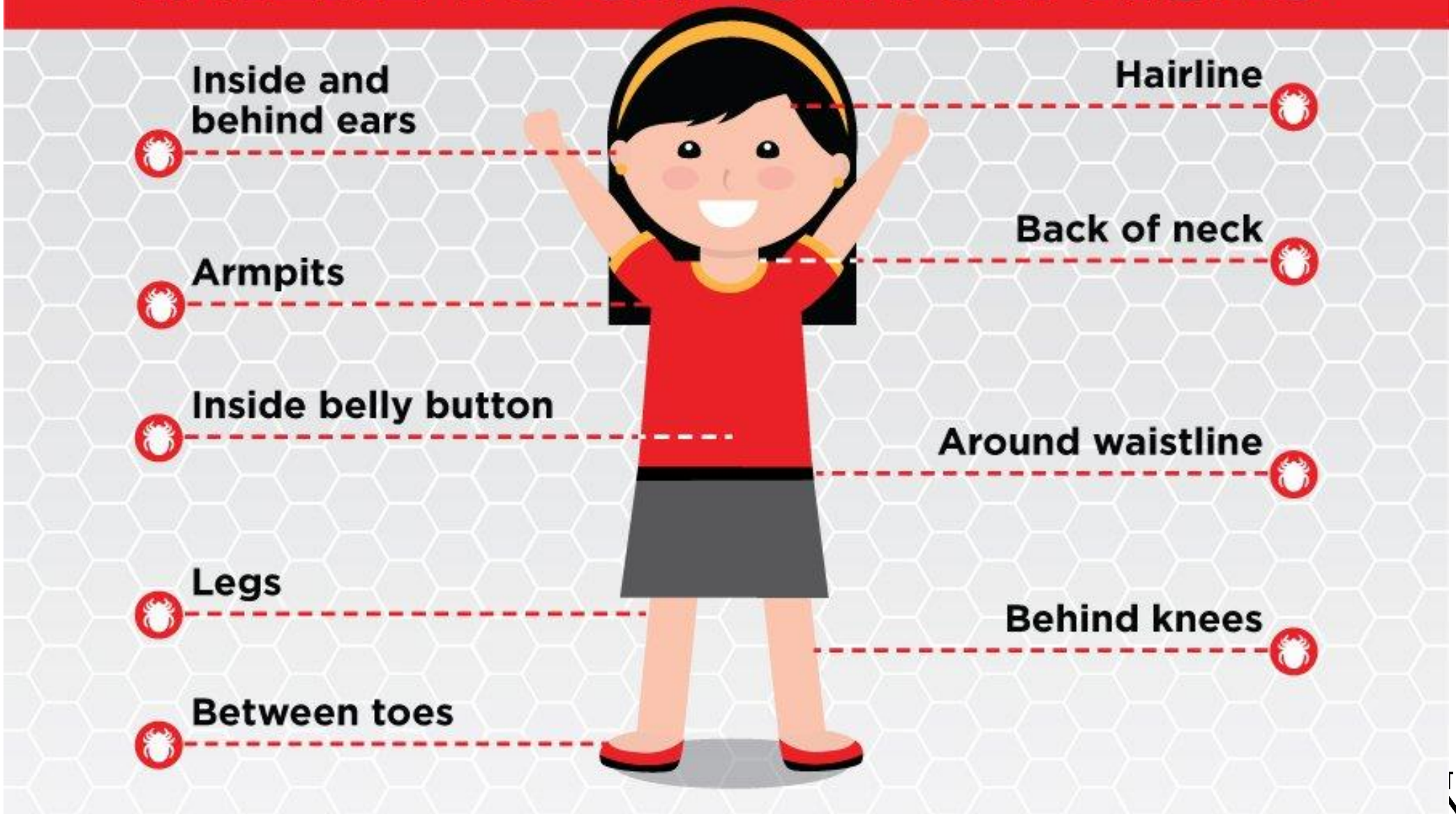
Natural Control

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Protect Yourself Against Lyme Disease in Spring, Summer, and Fall

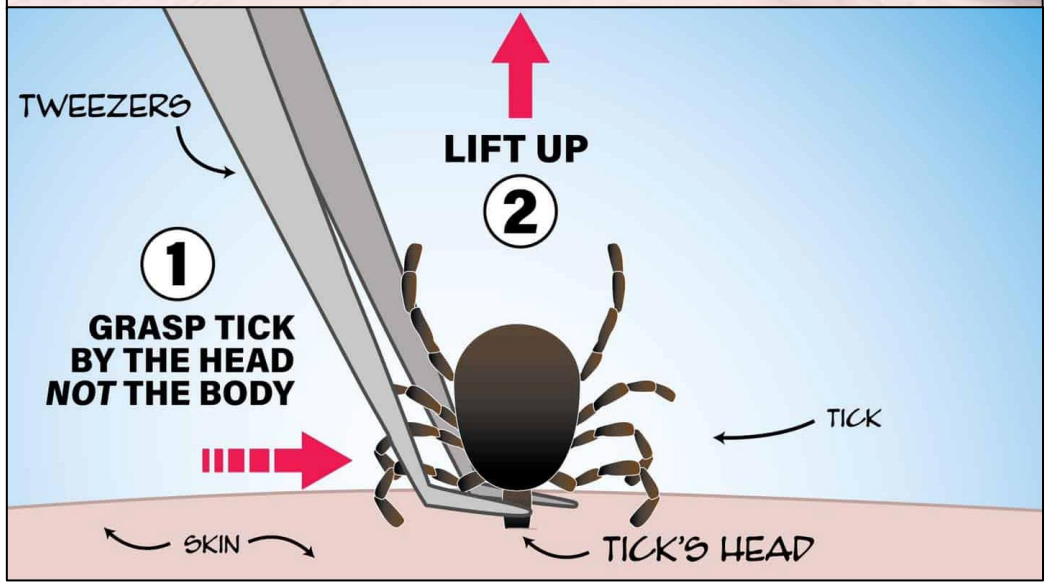


WHERE TO CHECK FOR TICKS



Tick Removal

DO



DO NOT

Where to get help

If you feel that you're not getting the care that you need, reach out to:

- "Lyme literate" doctors
  - Ask your community for help. Someone may have been through something similar and have a provider they like.
  - Ask your provider for a referral if you need more than they can give you
  - Look at reviews. There are some fabulous doctors out there, and there are some predatory 'professionals' out there
- Some non-profits can help with out of pocket expenses
  - Lyme Treatment Foundation, LymeLight Foundation, Patient Advocate Foundation, some local Lyme support groups may be able to offer assistance (or direction)
- Lyme/tick-borne illness support groups can
- Additional stressors

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Identifying engorged ticks

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Identifying engorged ticks

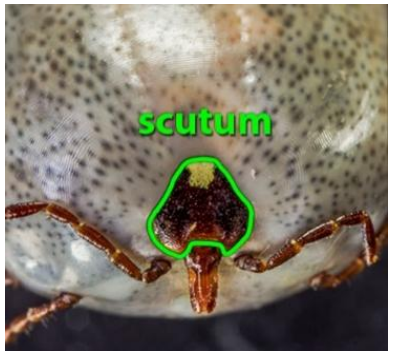
NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Identifying Engorged Ticks

Deer Tick

Dog Tick

Lone Star



NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Great Resources

Ticks/Tick-Borne Disease Info

- Tick Encounter
- Tick-borne Diseases of the US Reference Manual

Find a Lyme Specialist near you

- Global Lyme Alliance
- International Lyme and Associated Diseases Society (ILADS) provider search

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Questions?

Contact me anytime:
Amanda.Roome@bassett.org
607-547-6023 (ask for Mandy)