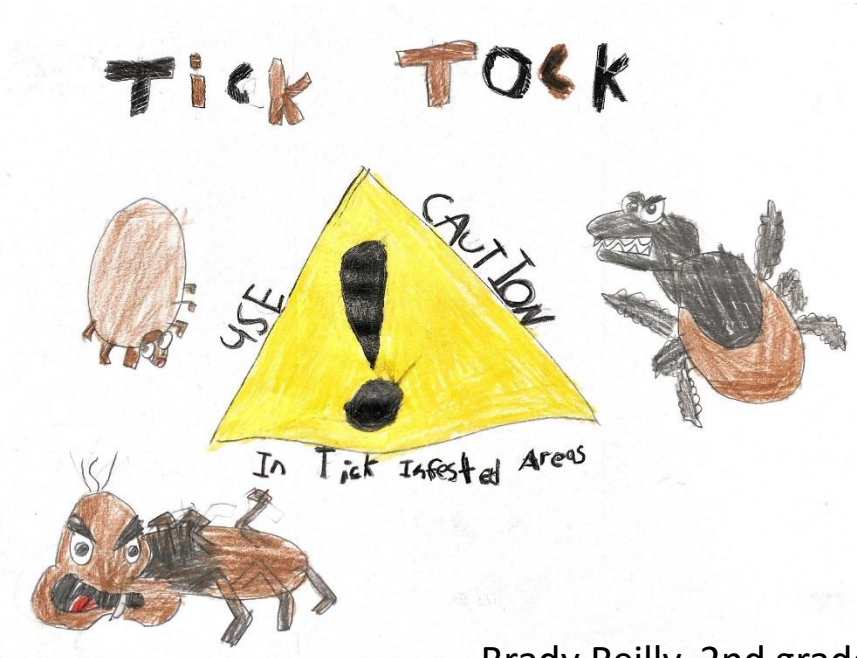
Tick Talk:

Avoiding Lyme and other Tick-borne Diseases while enjoying the great Maine outdoors



Brady Reilly, 2nd grade winner, Fruit Street School

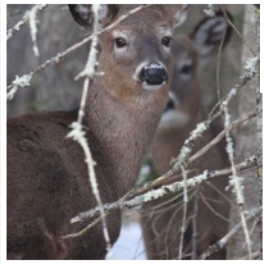
HEALTH > Posted February 11, 2020 | Updated February 12, 2020

Study shows 40% of deer tick samples tested positive for Lyme disease

The first-of-its-kind study by the University of Maine's Cooperative Extension Tick Lab included more than 2,000 ticks submitted last year by residents of all 16 counties.

more specifically, the ticks the deer carry — are the cause for a spike in Lyme disease cases on the island.

On Sept. 30, at a special town meeting, Islesboro

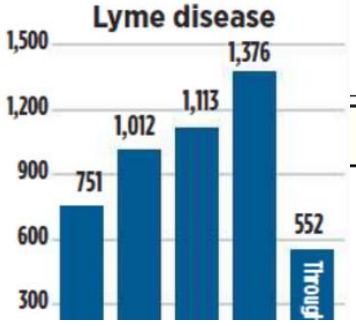


Aislinn Sarnacki | BDN
Two white-tailed deer pause at the edge of the woods on March 8,

Maine sees increase in non-Lyme tick illness

Cases of anaplasmosis and babesiosis, which can seriously affect health if undetected, are at or nearing record levels.

By ERIC RUSSELL



Tick Lab researchers found that 529 of the submitted ticks were found b

were gardening or doing yard work,

outside accounted for 96 tick sampl

trapping, 18 while logging, 15 while

Of the ticks submitted for testing, 9

found.

RICHARD S. OSTFELD, AMBER

REVIEW

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Human E

CLINICAL PRACTIC

Caren G. Solomon, M.D., M.P.H.,

Lyme Disease

Articles

and Tick-borne

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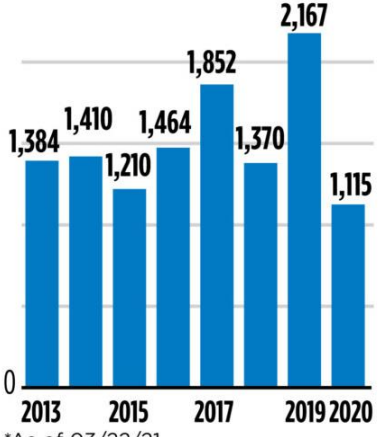
AEL A. BENJAMIN, AND FELICIA KEESING

Lyme disease in Maine

Lyme disease cases were down sharply in 2020, in part because a hot and dry June and July made ticks less active.



*As of 03/22/21
SOURCE: Maine Center for Disease Control and Prevention

STAFF GRAPHIC | MICHAEL FISHER

virus, spread by ticks, claims

-area artist

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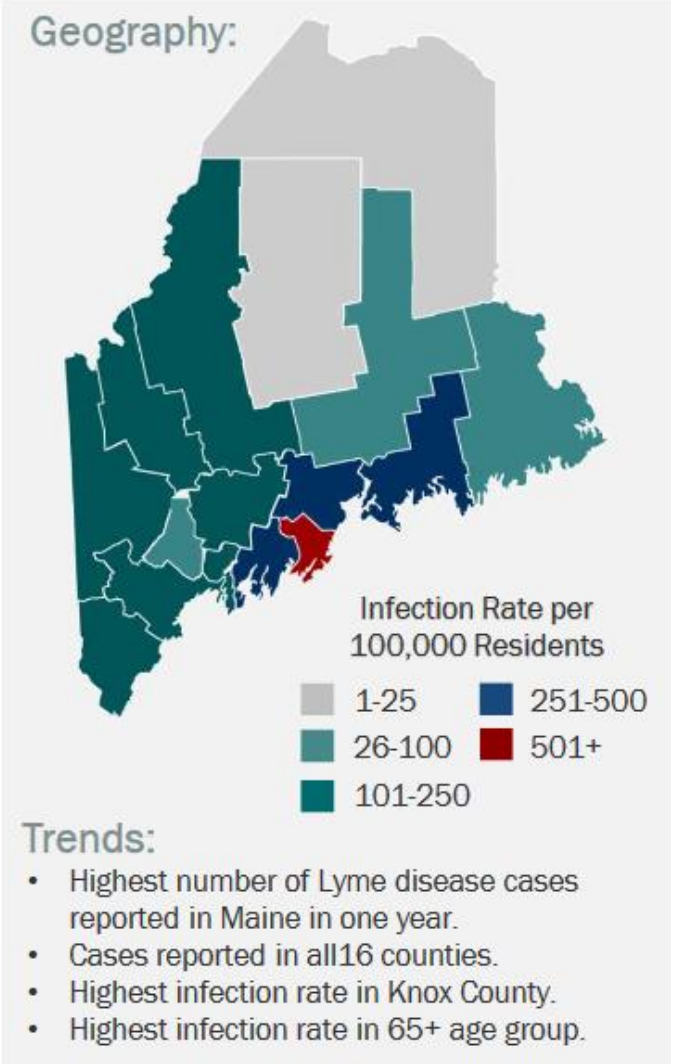
HEALTH CARE > Posted March 22 | Updated March 23

Lyme disease cases fell sharply in 2020, with COVID-19 and weather likely playing a role

Tick activity is normal so far this spring and the drop in cases is likely because of the dry summer and people avoiding health care during the early stages of the pandemic.

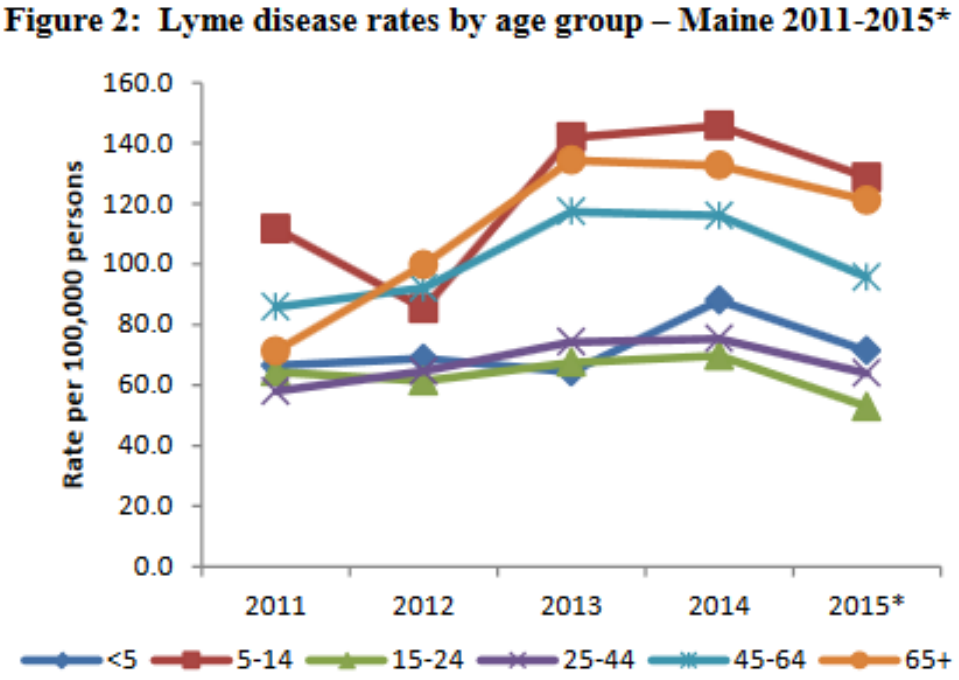
The good news is….

- **If you take precautions, you can avoid infection.**



- Lyme disease, the most common tick disease, was reported for residents in all counties in Maine
- **The coast of Maine is a high-risk tick zone**

Lyme affects all age groups



- The greatest incidence of LD is for 5–14 year olds, followed by 65+ years

Enjoying the coast

- If you spend time outdoors, you will be exposed to ticks.

Gardening/yardwork

Where is the best place to find ticks? In your back yard!

Tick Lab researchers found that 529 of the submitted ticks were found by people who were gardening or doing yard work, 267 while walking, and 129 while hiking. Playing outside accounted for 96 tick samples, 29 were found while playing sports, 29 while trapping, 18 while logging, 15 while camping, 10 while bicycling, and five while fishing.

Of the ticks submitted for testing, 95 percent were attached and feeding when they were found.

- Half (40% most recently) of ticks are infected with Lyme disease in Maine
- 8% carried anaplasmosis
- 6 % carried babesiosis

Where else can you find ticks?

- Where people found ticks:
  - Legs: 23%
  - front or rear torsos: 17%.
  - Heads and arms: 12%
  - Groin: 8 %
  - Neck: 6%

--Source: University of Maine's Cooperative Extension Tick Lab

> 2,000 deer ticks submitted 2019 by residents of all 16 counties.

More about ticks..

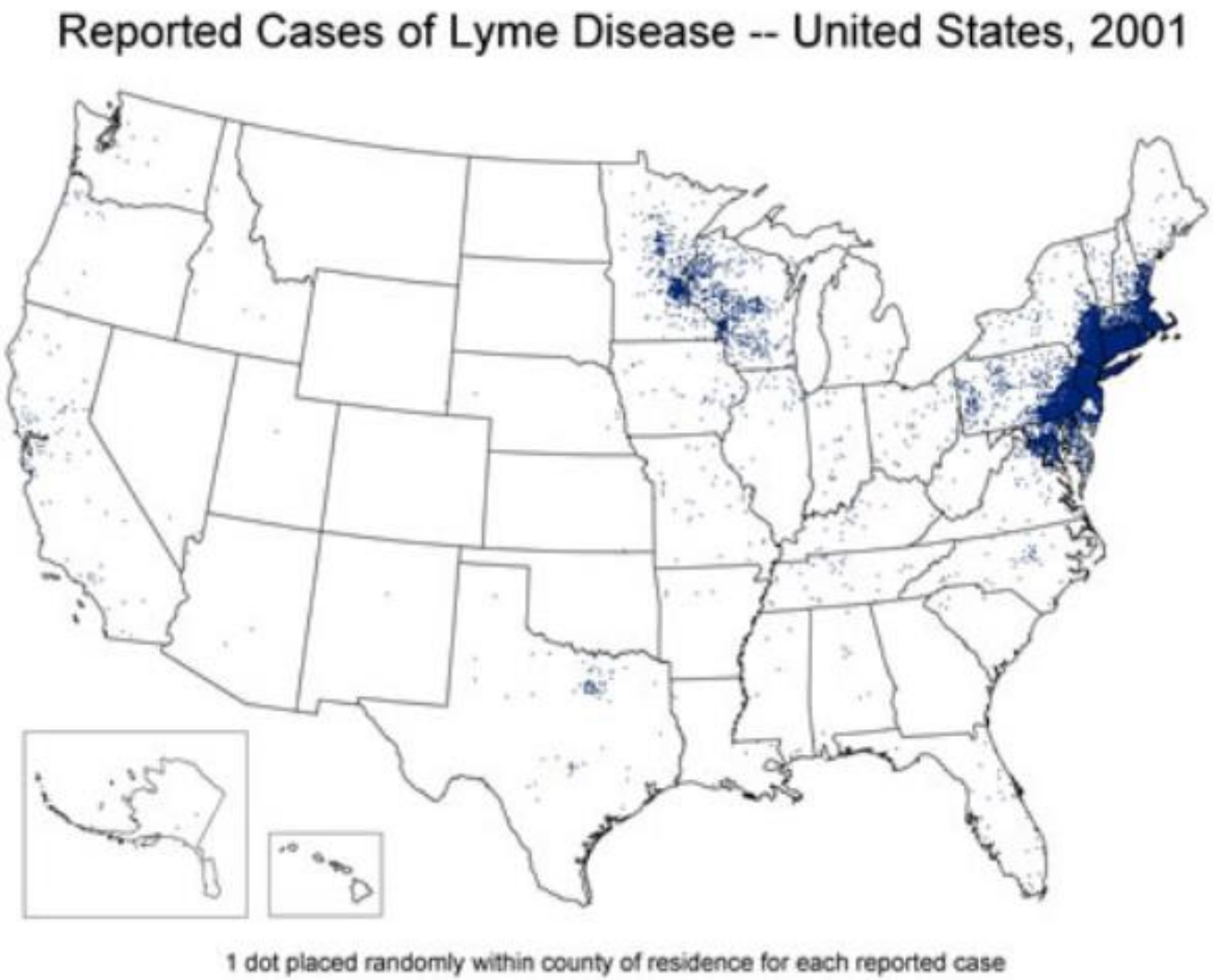
- Deer ticks **need a damp, humid environment** to survive (think spider…)
  - Usually in wooded areas and wooded edges, leaf litter, low ground cover.
- Ticks do not hop like fleas, they crawl
- **Ticks are usually picked up on the lower leg and tend to crawl up the body looking for a place to attach and feed.**
- Deer **ticks attach to clothing** and then crawl upward.
  - Ticks seek a moist protected place to hide, so check sweaty/moist areas (armpits, behind knees, naval, behind ears, skin folds, hair)

Things to know…

Deer tick adult and nymph.
Source: Griffin Dill

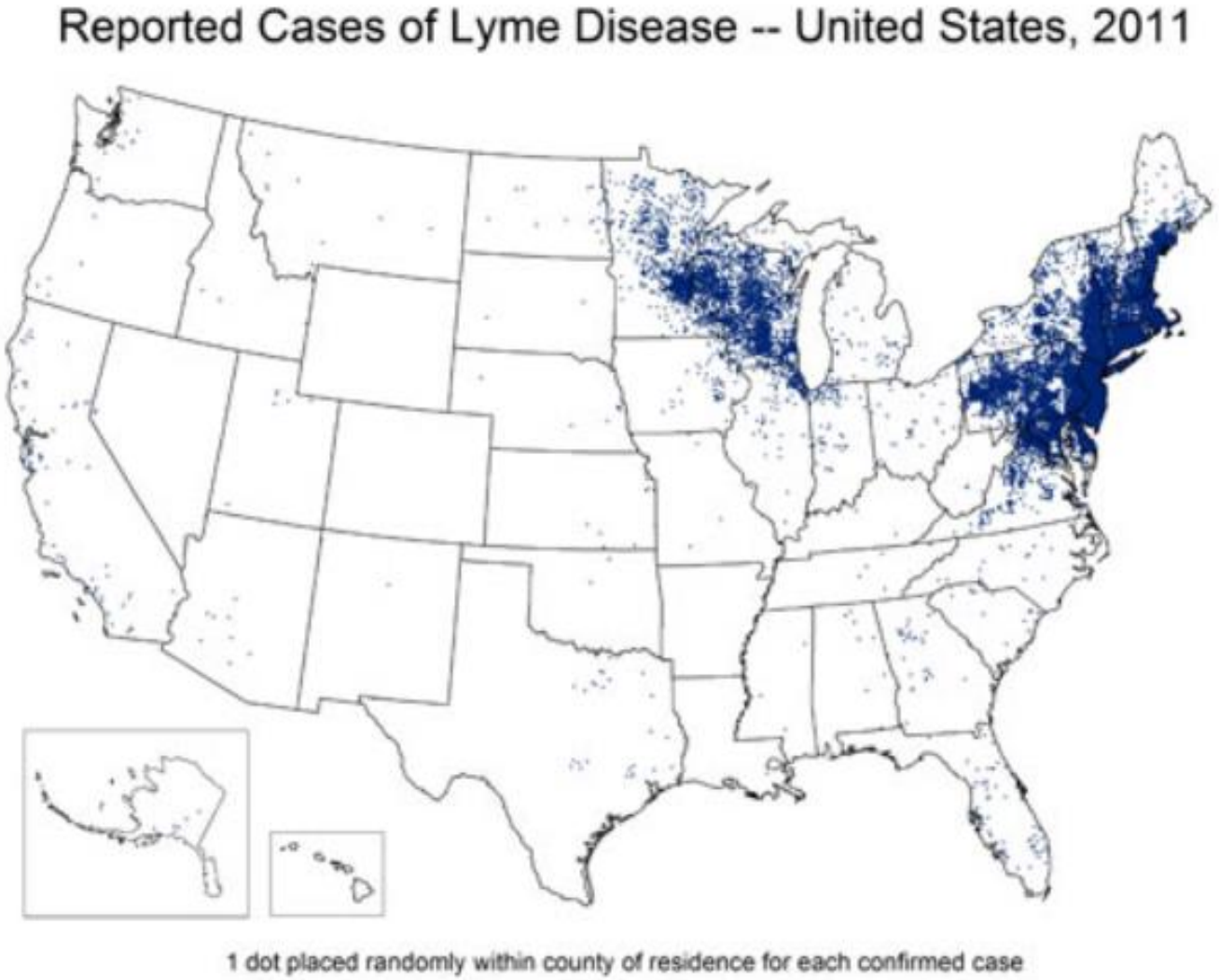
- Deer ticks are pervasive most of the year.
- Most deer ticks here are infected with ≥ 1 serious diseases
- If you don't take precautions, odds are you will get infected
- Problem is getting worse (climate change, more deer, fewer predators, …)

2001

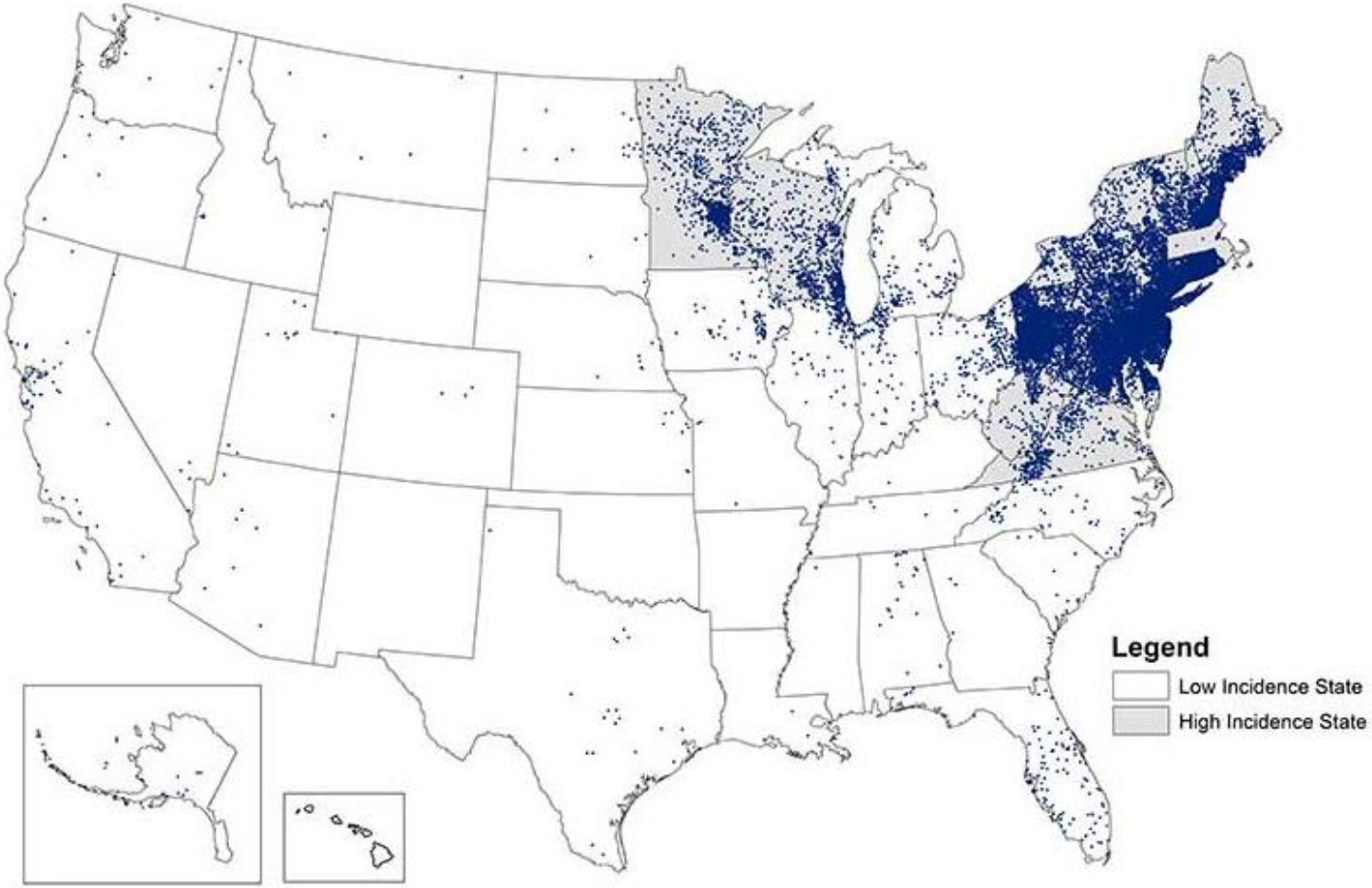

Reported Cases of Lyme Disease -- United States, 2001
1 dot placed randomly within county of residence for each reported case

CDC.gov

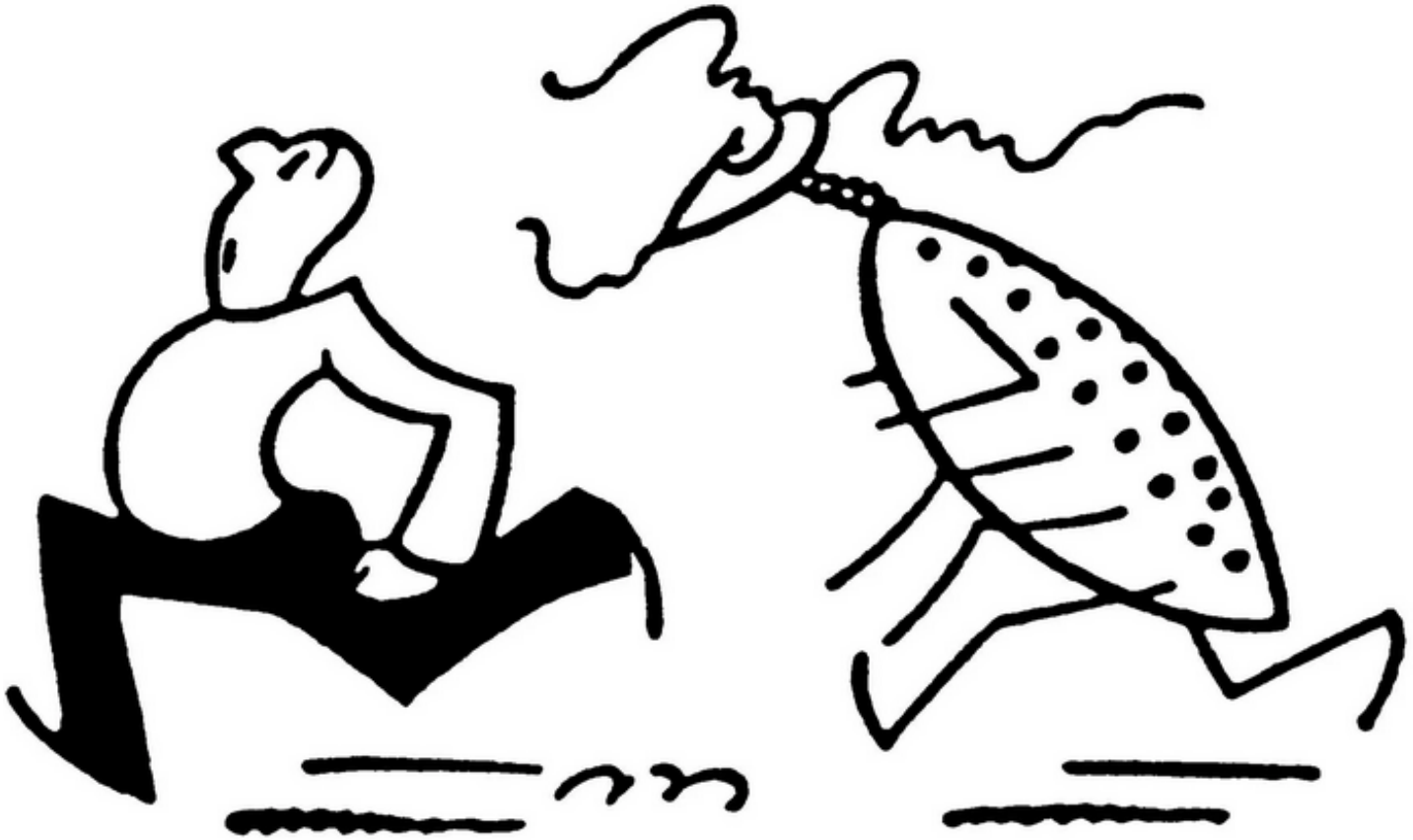
2011


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*



Lesson 1. Avoid deer ticks

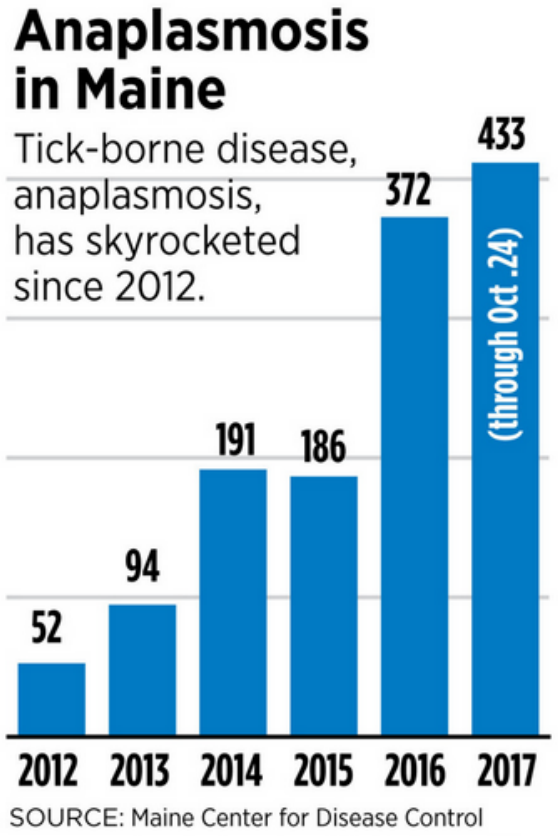


How to avoid ticks

- Before you go outdoors
  - Dress smart: treat clothing and gear with permethrin or buy pre-treated items to repel ticks.
  - Tuck in pants and shirts to keep them out
  - Use EPA-registered insect repellents on exposed skin
- When outdoors:
  - Avoid grassy, brushy, and wooded areas, where ticks may be found.
  - Stay in middle of trails (avoid brushing against tall grass)
- After you come indoors
  - Check your clothing for ticks.
  - Put clothes in dryer for 10 minutes (kills ticks)
  - Shower and perform a thorough tick check.
- If you see an attached tick, remove it immediately and properly.
  - Take steps to prevent ticks on your pets and in your yard.

It’s not just Lyme Disease

- Deer ticks carry and transmit a number of ***viruses, bacteria, and Protozoa that cause*** diseases that can kill you or cause you serious harm.
- There are no vaccines; no immunity.
- You can get reinfected as often as you like.



Tick-born Diseases in Maine

- **Lyme disease** *(Borrelia burgdorferi)*
  - Most common, serious but treatable
- **Anaplasmosis** (human granulocytic erlichiosis) *(Anaplasma phagocytophilum)*
  - Severe acute illness, fever, decreased WBC and platelets
- **Babesiosis** *(Babesia microti) ("Nantucket Fever")*
  - Fever and anemia; potentially fatal if no spleen or immunocompromised

Uncommon:

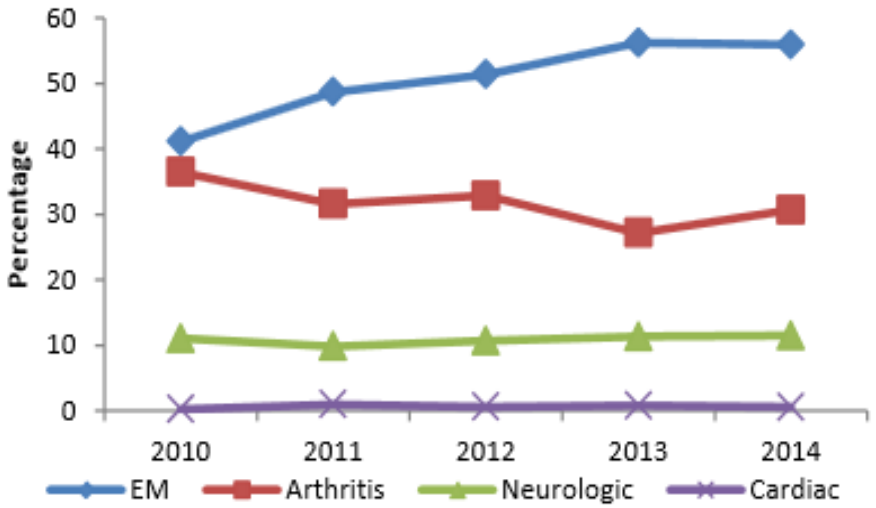
- **Powassan disease** (Deer tick virus)
  - No treatment, fatal encephalitis 10%-15%. 3 cases in Maine in 2017
- **Relapsing Fever** (*Borrelia miyamotoi*)
  - Like Lyme but worse (and no rash)
- **Erlichiosis** (10 cases in 2017)
- **Spotted Fever Rickettsiosis** (including Rocky Mountain Spotted Fever) via dog tick. 3 cases in 2017
- Heading our way: Hartland virus, Bourbon virus

Human Lyme disease data for Maine can be found at: Data Portal - Lyme

Early Symptoms of Lyme Disease

- **Resembles a viral syndrome**
- Many (50-80%) have a rash
- Few (25-36%) recall a tick bite
- Most recover rapidly and completely with antibiotics
- Treatment: 10 days-4 weeks of oral antibiotics.
- If untreated, it spreads beyond the skin through the blood: 60% develop persistent arthritis (e.g., knee), 10% neurological (facial nerve palsy), 5% cardiac (A-V block).

Figure 3: Percentage of symptoms reported among Lyme disease cases – Maine, 2010-2014*



Rash

Joint pain

Neurologic

Cardiac

Characteristics:

3% hospitalized	15% had a previous Lyme diagnosis	36% reported history of tick bite
3% co-infected with anaplasmosis	1% co-infected with babesiosis	<1% co-infected with all three diseases
47% reported an EM (bullseye) rash	32% reported joint pain	
9% reported neurologic symptoms	<1% reported cardiac symptoms	
4% had spinal nerve or nerve root disease	4% had Bell's palsy or cranial nerve inflammation	1% had encephalitis/ encephalomyelitis

Lyme Disease in Maine

Tick-borne Diseases: Symptoms

	Lyme	Anaplasmosis	Babesiosis	Powassan
Rash	++++			
Fatigue	+++	++	++	
Muscle aches	++	+++	++	
Joint aches	++	+		
Headache	++	+++	++	++++
Neck stiffness	++			
No appetite	+		++	
Swollen nodes	+			
Fever/chills	+	+++	+++	++++
Malaise/restlessness		+++		
Nausea		++	++	+++(+ vomiting)
Confusion, seizures, memory loss				++++
Abnormal blood tests		LFTs, platelets, WBC	Hemolytic anemia	
Death		+	+ (*if no spleen)	+

The Lyme Rash

- Rash begins at the site of the tick bite 3- 30 days after exposure and usually grows in size for several days.
- Where: often near the arm pit, groin, behind knees, or at the belt line (navel)
- Usually not painful, itchy, or warm.
- Expands to 5-30 cm. **Use permanent marker to outline perimeter, check to see if it's expanding. Take photos.**
  - During the first days, lesions may be uniformly red. As it expands, some central clearing may develop, and a more complex target or bull's eye appearance (less than half or even 10% of cases)
  - Central clearing is considered classic for EM, it often requires considerable expansion of the lesion and is usually not yet present in the first days of illness.

Erythema Migrans: Hallmark of Lyme Disease?

Bulls-eye with darker edge

No, usually not seen!

Where: often near the arm pit, groin, behind knees, or at the belt line (navel)

Erythema migrans lesion with uniform erythema

Erythema migrans lesion with uniform erythema. Note that the lesion is not a perfect circle.

Erythema Migrans:

Actual Bull's-eye:

Bulls-eye rash (target lesion):

Multiple erythema migrans lesions

Multiple erythema migrans lesions of early disseminated Lyme disease. In Panel A, the more typical primary lesion is on the abdomen, with a smaller secondary lesion on the upper thigh.

Deciphering Rashes

Condition	Characteristic
Lyme (Erythema Migrans)	**Red**, **flat**, **ring shaped**, enlarges rapidly to 5-30 cm in diameter, uniformly red or with more central redness; may have central clearing; without treatment, lasts 3-4 weeks; **not painful or itchy**
Spider bite	Central dead (black) spot ("eschar"), often very painful
Ringworm (tinea)	Rash with raised margins and scale on the edges; central clearing, itchy.
Insect bite	Often raised bump with a central sharp point; itchy, usually does not continue to enlarge, usually smaller than EM
Cellulitis (skin infection)	Usually at site of trauma to skin, feels warmer to touch, enlarges rapidly, rarely circular, tender, may be associated with fever
Granuloma annulaire	Small (2-5 cm diameter) circular rash with red bumps and clear center, develops over weeks, often on back of hands and feet
Nummular eczema (dry skin)	Smaller and less red than EM, does not enlarge, itchy, clear margins, skin thickened or weepy.
Hypersensitivity to tick bite	Small lesion (<5 cm), does not expand, seen at the time of tick bite or soon thereafter, uniformly red, often itchy

NEJM

Alpha-gal syndrome

- Alpha-gal syndrome (AGS) (*alpha-gal allergy*, *red meat allergy*, or *tick bite meat allergy*)
  - **serious**, potentially life-threatening **allergic reaction**.
  - AGS may occur after people eat red meat or are exposed to products containing alpha-gal.
- Alpha-gal (galactose-α-1,3-galactose) is a sugar molecule in mammals.
  - Alpha-gal can be found in products made from mammals (including some meds, cosmetics, vaccines, gelatin, and milk products).
  - There is evidence that the alpha-gal molecule is found in the saliva of certain types of ticks

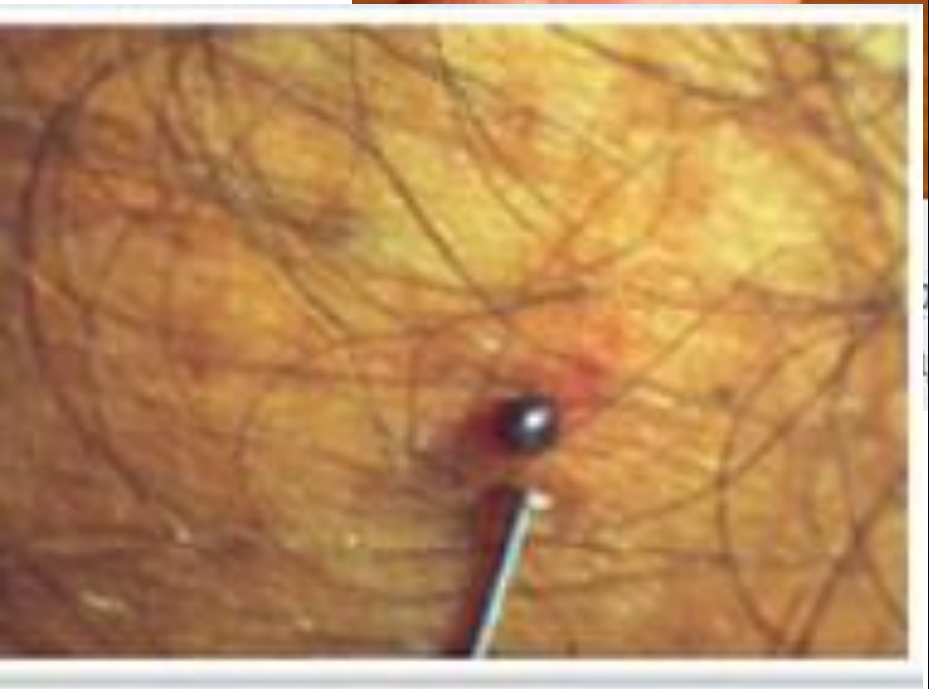
- **Can you get AGS from a tick bite?**
  - Growing evidence suggests that AGS may be triggered by the bite of a **lone star** or **blacklegged (deer) tick**.
  - More research is needed.

Tick Identification 101

What kind of tick is this?

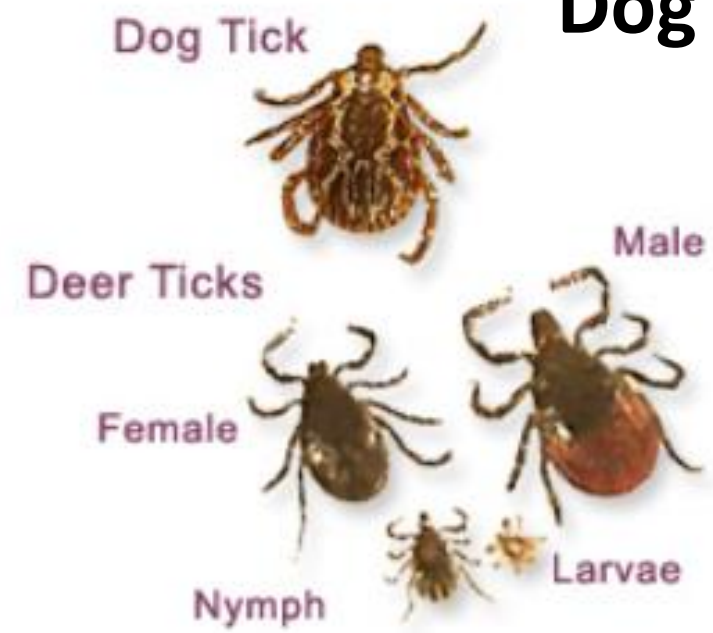
Deer tick adult and nymph.
Source: Griffin Dill

The Black-legged tick, Ixodes Scapularis, or deer tick that carries diseases



Engorged nymphal tick
compared to a pin.

Dog vs Deer Tick



The deer tick, Ixodes scapularis (dammini), : nymph, adult male, adult female, engorged adult female.

American dog tick, Dermacentor variabilis, adult male, adult female, engorged adult female.

Unfed and engorged female deer tick

Female with egg mass


© G M Dill
Deer tick
(engorged female)
Dog tick
(engorged female)


This rather intricate, somewhat hexagonal dark area above the head of this engorged female Dog tick is a key feature to look for to help differentiate between a female Dog tick and a female Deer tick.
© G M Dill
American Dog Tick (Dermacentor variabilis)

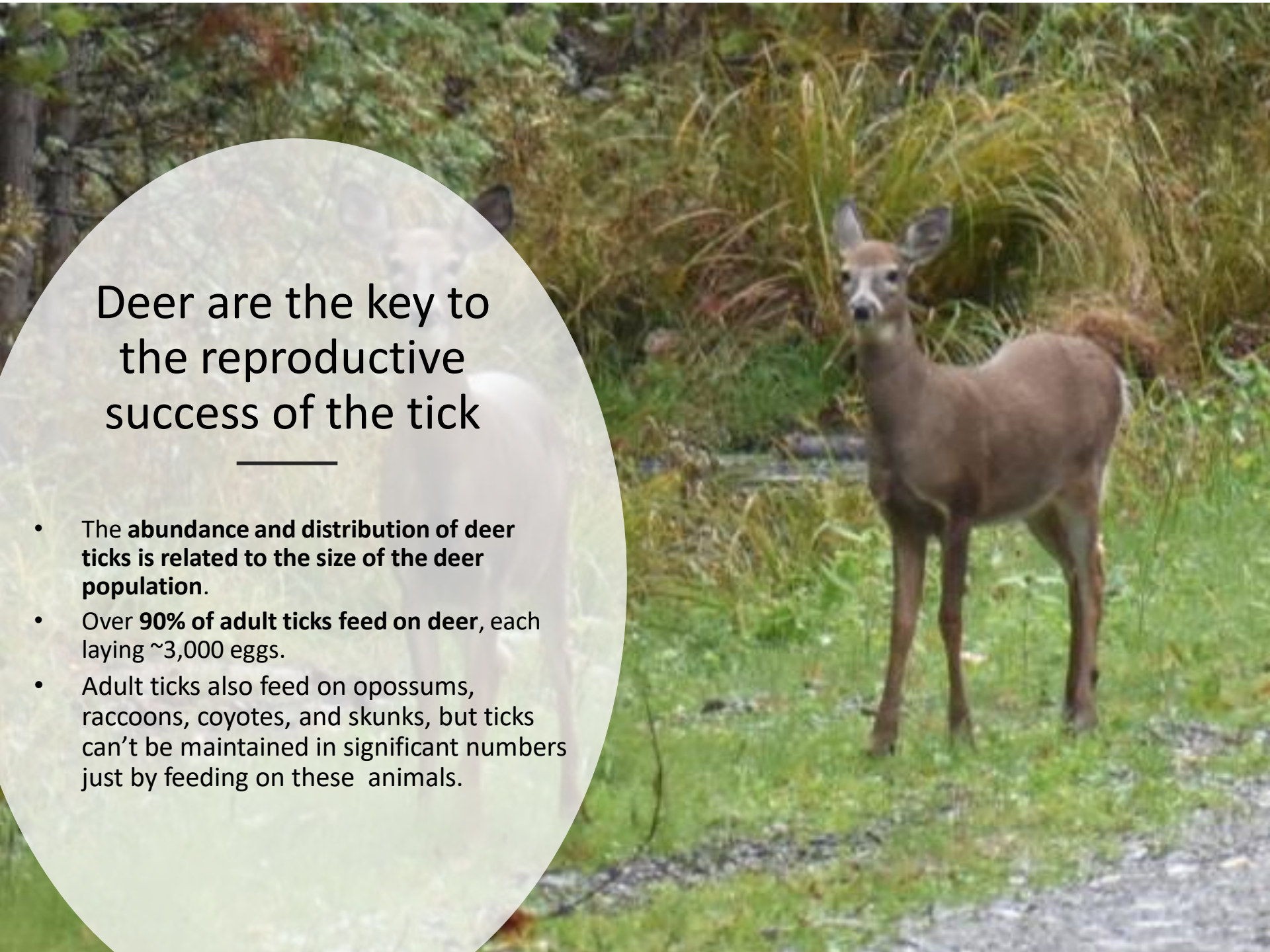
Lone Star Ticks

Adult Female

Adult Male

Nymph

- Lone star ticks can carry Rocky Mountain spotted fever, tularemia, tick paralysis, STARI (southern tick-associated rash illness), and ehrlichiosis.
- Some develop **allergic reactions to red meat** following the bite of a lone star tick.
- They are often found in dry forested sites with shrub undergrowth and along rivers and streams near animal resting places.
- **In Maine, lone star ticks are relatively rare** in comparison to other tick species, **but they are being found more frequently than in the past**.



Deer are the key to the reproductive success of the tick

- The **abundance and distribution of deer ticks is related to the size of the deer population**.
- Over **90% of adult ticks feed on deer**, each laying ~3,000 eggs.
- Adult ticks also feed on opossums, raccoons, coyotes, and skunks, but ticks can’t be maintained in significant numbers just by feeding on these animals.

Important factoids

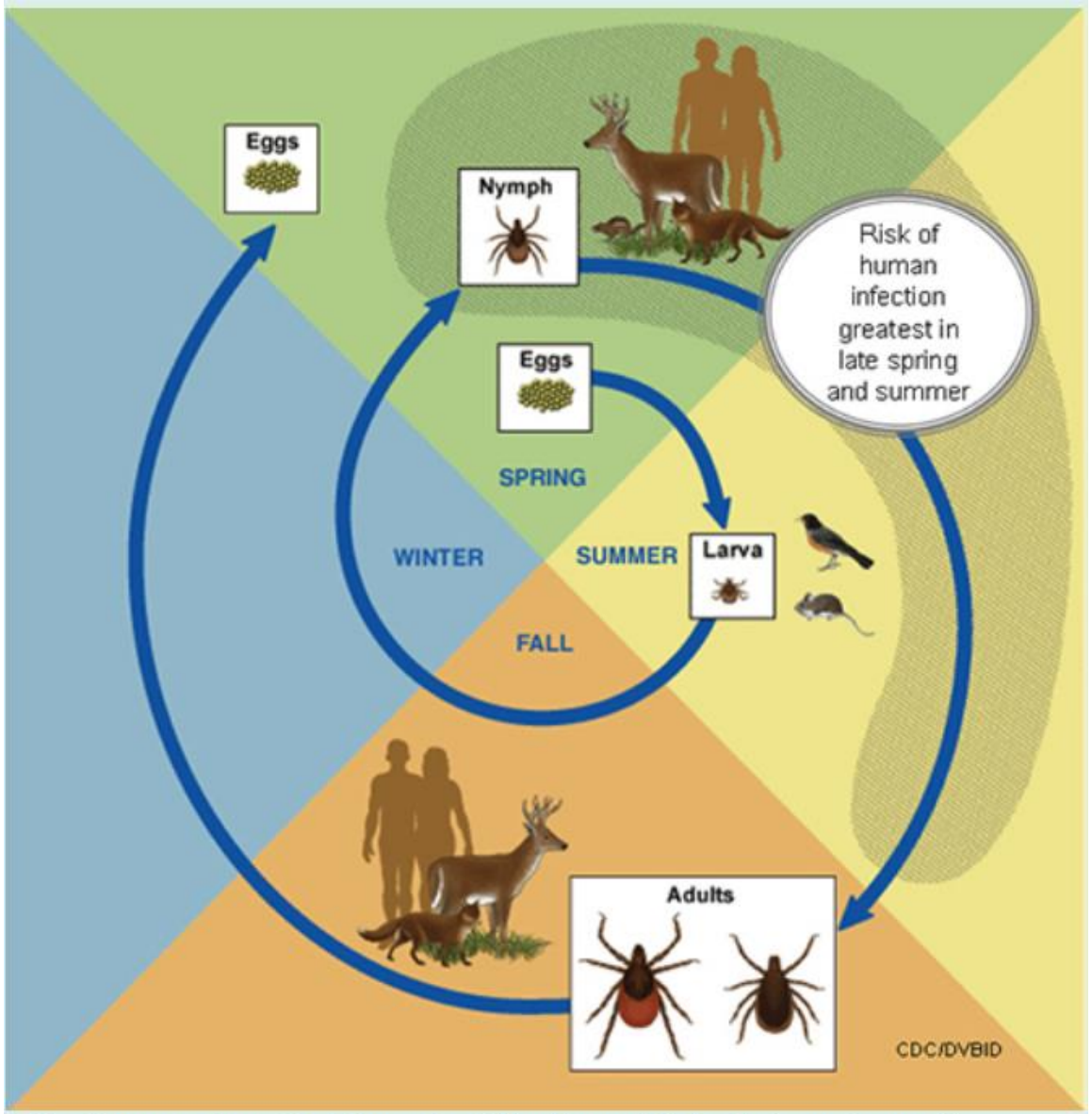
- Deer transport blood-engorged female ticks into the property where they can lay thousands of eggs, increasing the number of larval ticks that feed on small animals
- Each deer, each year, support ~500,000 new larval ticks.
- A single opossum may kill 5,000 ticks every week (immune system + they groom and eat ticks)
- Foxes eat white-footed mice. Coyotes kill foxes or scare them away.
- Japanese barberry provides ideal environment for ticks—humid enough for questing and mating.

Deer ticks need mice and deer to reproduce

- The natural reservoirs for Lyme and other diseases are mice, chipmunks, other small mammals, and birds (these animals **carry and spread the diseases**)
- Deer do not carry the disease, but **are critical in sustaining the life cycle of diseased ticks**.

The Secret Life of Deer Ticks

- Deer ticks **need a damp, humid environment** to survive
  - Usually in wooded areas and wooded edges, leaf litter, low ground cover.
  - **Not open fields** or areas without shrubbery nearby
- After attaching to a host for a few days to weeks, they drop off, spend weeks to many months digesting the blood meal, molt to the next stage, the repeat the process with a different host.
- Adult ticks reproduce and die **after** their 3rd blood meal.

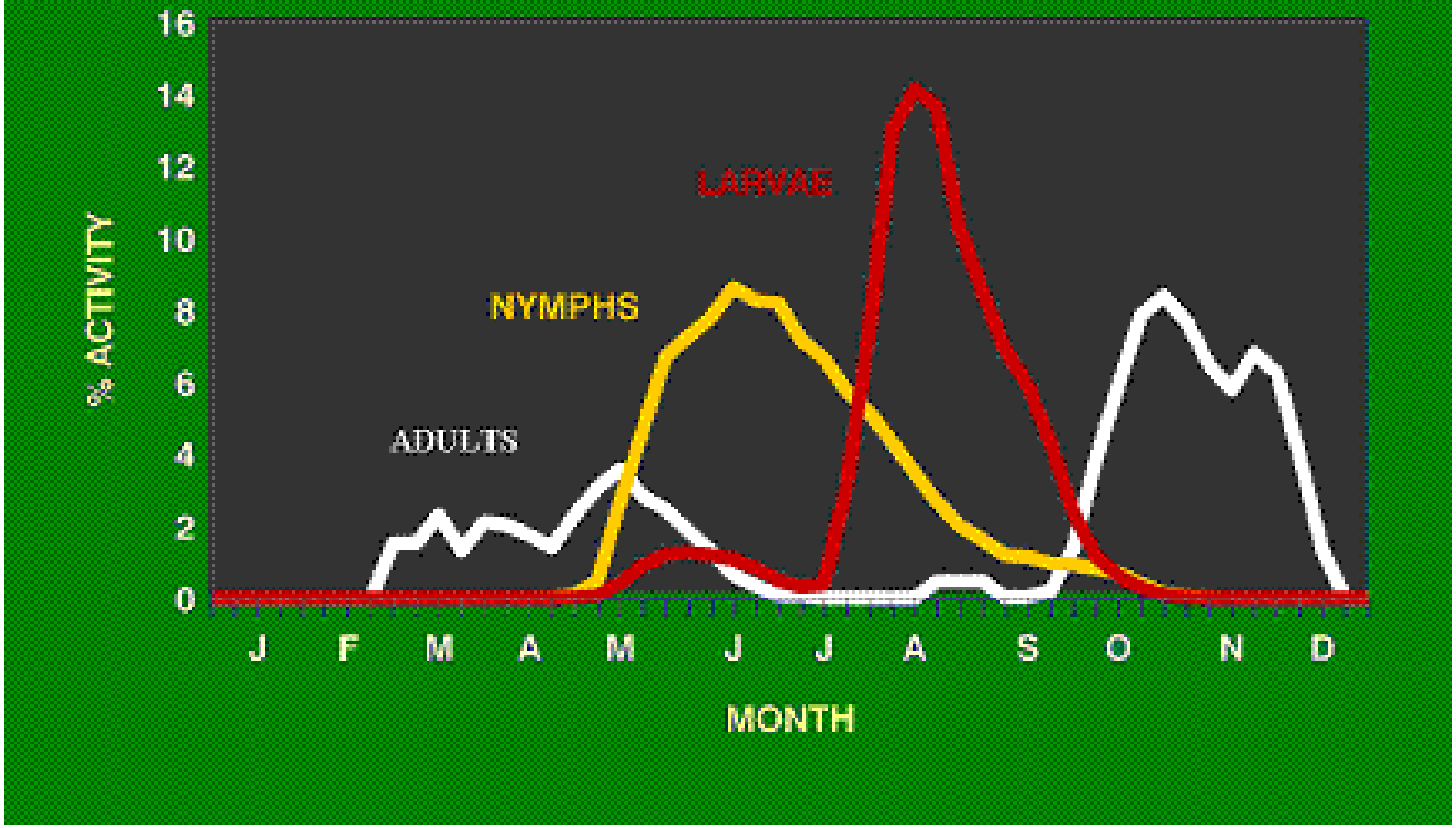


This diagram shows the life cycle of blacklegged ticks that can transmit anaplasmosis, babesiosis, and Lyme disease.

Peak activity for the adult deer tick is in the fall.

http://www.cdc.gov/ticks/life_cycle_and_hosts.html

SEASONAL ACTIVITY OF *I. SCAPULARIS*



Ticks are out mid-February through mid-December
If it's above freezing, the ticks are out. Most are diseased.

Blood-sucking Parasites with infrared sensors!

•Stand on their back legs with their front legs outstretched, the blood-sucking parasites perch on the tops of grasses and other vegetation, awaiting the approach of a host,

•**They sense our arrival** by the vibrations of a footfall, hint of carbon dioxide, or a sudden rise in temperature caused by the potential victim's body heat.

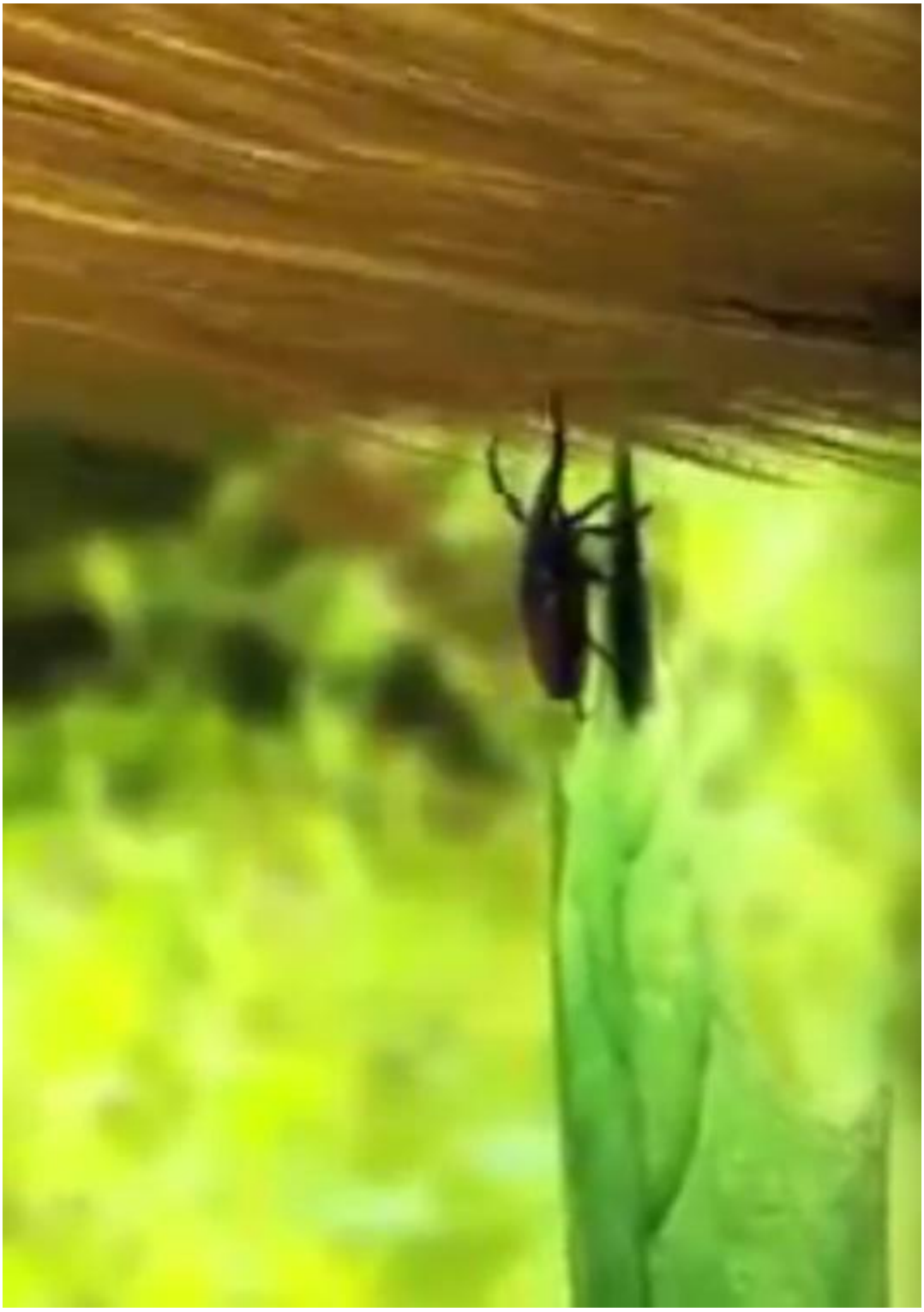
Deer tick perched on blade of grass waiting for a feast to walk by.

Ticks have super powers

- They sense us coming
  - They monitor vibrations in the ground
  - They sense body heat, smells, and carbon dioxide.
- When a promising animal passes by, it reaches out with its legs, which have little hooks to grab hold.
- We can't feel their bite (and no itch)
- They know where to hide where we can't see them
- They don't come off easily.
- We are at a competitive disadvantage

Tick Questing, in slow motion

Tick on left, skin on right



Ticks are clever.

- We can’t see them
- They can sense us coming
- We can’t feel them bite
- They hide where we can’t find them
- They don’t come off easily

Reduce exposure through landscaping

- Ornamental shrub species like Japanese barberry are favorite homes for ticks (wildlife like berries)
- **Most ticks on lawns are found in the transition area between the lawn and the woods**.
- **Mow**—keep grass low
- Increase light and **reduce dampness.**
- Install a wood chip, mulch or gravel barrier where lawn meets woods.
  - The dry barrier makes it more difficult for the ticks to migrate.
- **Stone walls shelter** mice that carry ticks—**clear away brush**

Pesticides

- Chemical pesticides work but are toxic to vertebrates; **all are lethal to invertebrates** (pollinators, etc); repeated application can cause insecticide resistance
- Possibly true?: A botanical pesticide made of rosemary oil is just as effective at killing ticks as a chemical spray.

Recipe:

- Pour water into a 16-ounce spray bottle, add 5 to 10 drops of rosemary Essential oil, shake. Some recipes say add a few drops of a natural soap as an emulsifier.

Pets

Elimitick Tick Repellant Dog Vest

•Lyme disease is bad for dogs.
•Engorged deer ticks dropping off a pet will not survive or lay eggs in the house as the air is generally too dry.
•To protect pets: tick repellents, acaricides and Lyme vaccines for dogs
•Cats: Although the bacteria that cause Lyme disease is capable of infecting cats, the disease has never been seen in a cat outside of a laboratory setting.

http://bakerinstitute.vet.cornell.edu/animalhealth/page.php?id=1101

Protect dogs

Best tick repellents for dogs

Best oral tick treatment

Bravecto Chews for Dogs $57

Best topical tick treatment

Bayer Animal Health Seresto Flea and Tick Collar for Large Dogs $54

Protection

- **Hike/play smart**
- Dress for success
- Use repellents effectively
- Check for ticks afterwards
- Remove ticks correctly
- Protect your piece of Eden

Dress for Success

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PANTS & SHORTS

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Season
Fall 2014 (1)
Spring 2014 (4)

Price
$60 - $79 (3)
$80 - $149 (2)

Color
Black/Grey (2)
Blue (2)
Brown (5)

Size
04 (4)
06 (5)

Women's BugsAway® Damselfly™ Pant

Women's BugsAway® Ziwa™ Convertible Pant - 32" Inseam

Women's BugsAway® Ziwa™ Convertible Pant Petite - 29" Inseam

Women's BugsAway® Damselfly™ Pant

Killer Fashion Pointers

- Wear white/light colors
- Pants, long sleeves
- **Tuck** shirt into pants, pants into socks
- Spray DEET on pants, socks (or use pre-treated clothes)
- Use repellent on clothes. Larval and nymphal ticks may penetrate a coarse weave sock
- No open-toed shoes/sandals
- Ticks brought into the house can survive several days, depending on humidity.
- Ticks can survive a warm or hot wash, but not more than a few minutes in a hot dryer
- Spray shoes, clothes with Permethrin

Wear tick-proof clothes

- Clothing that's been treated with permethrin.
  - Insect Shield in North Carolina.
  - You can send them your clothes to treat.
  - It can go through the wash about 70 times and still be effective.

DYI

Best tick-repellent clothing treatment


PERMETHRIN
INSECT
REPELLENT
CLOTHING & GEAR
SAWYER

Apply tick repellents

Sawyer Products Premium Insect 20% Picaridin

Best botanical tick repellent

Artizen Lemon Eucalyp Essential Oil

$15

Though the CDC and EPA do recommend essential oils like and lemon-eucalyptus oil as s effective repellents of black-le ticks in yards and on skin, Ma wouldn't advise essential oils primary line of defense. "I'm h

Tick Repellants:

- Apply to **exposed** skin and/or clothing (as directed on the label). **Do not apply repellents under your clothing.**
  - DEET is a solvent—don't use on plastics, rayon, spandex, leather, and painted or varnished surfaces
- Use only EPA registered products:
  - **DEET** (20-30%) 2-8 hours of protection
  - **Picaridin**: 4-8 hours of effectiveness; derived from pepper, does not harm plastics or fabric, but new (2005).
  - **IR3535:** relatively non-toxic, 4-6 hours of effectiveness, but 10-100 times **less effective** than DEET.
  - **Oil of Lemon Eucalyptus:** (p-menthane 3,8-diol or PMD) plant-based, effective against mosquitoes, black flies, biting midges, ticks, and gnats. Similar to concentrations of 20-30% DEET, but for much shorter periods of time.
- Higher percentage of active ingredient typically provide longer-lasting protection.

- INEFFECTIVE for TICKS: Citronella, Essential oils

Tick Repellants:

- Apply effective repellent -- particularly on shoes, socks, and pant legs.
  - Avoid applying high-concentration products to the skin, especially on children.
- Use **just enough** repellent to cover exposed skin and/or clothing.
  - Heavy application does not give you better or longer lasting protection.
  - Reapply as directed on product label
- Permetrin for pre-treating clothes, shoes, socks—6 weeks protection, 6 washings. Store in black bag.
- Pretreated permethrin clothes—70 washings
- Avoid using a repellent that is pre-combined with sunscreen.
  - The sunscreen will need to be reapplied more often than the repellent so you might end up using too much repellent.

Repellant and sun protection

- No: combined products. Sunscreen needs to be reapplied q2 hrs, leading to overexposure of insect repellant. There are combined products containing IR3535® that provide both insect and sun protection.
- Yes: apply sun protection first, wait 10 to 15 minutes, and then apply the insect repellent.
  - If you apply sun protection after a repellent, this may reduce the effectiveness of the repellent since insects cannot “smell” the repellent anymore.

Tick Checks

Tick checks

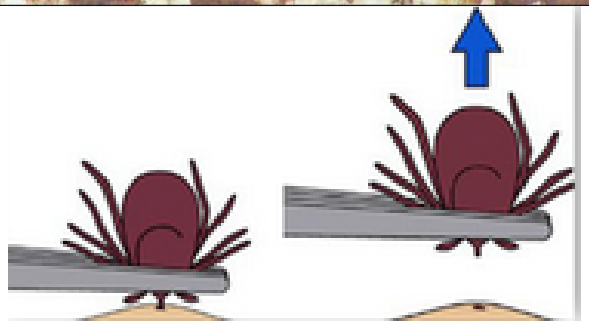
- Thoroughly inspect body. Look and feel...a thorough tick check should take at least 30-45 seconds.
- **Check moist areas near elastic waistbands or bra straps**.
- Use fingertips to feel for small bumps, inspect:
  - Scalp
  - In and around the ears
  - Hairline and neck
  - Arms
  - Armpits
  - Back (full length mirror or partner to assist)
  - Torso
  - Belly button
  - Entire groin area, front and back
  - Between all skin folds
  - Legs
  - Behind the knees
  - Between toes

- When shampooing hair, keep fingers together while massaging the scalp to help sweep the head

Shower afterwards

Tick removal

- Use tweezers to grasp the tick as close to the skin surface as possible.
- Pull straight up gently but firmly, using steady pressure. Do not jerk or twist.
- **Do not squeeze, crush, or puncture the body of the tick**
- **Disinfect the skin** thoroughly after removing the tick and **wash hands**
- Save the tick in a bottle of 70% alcohol.
- If sections of the tick remain in the skin, they should be left alone.
- Observe the area for the development of rash for up to 30 days. Tick saliva can cause transient redness that should not be confused with EM.

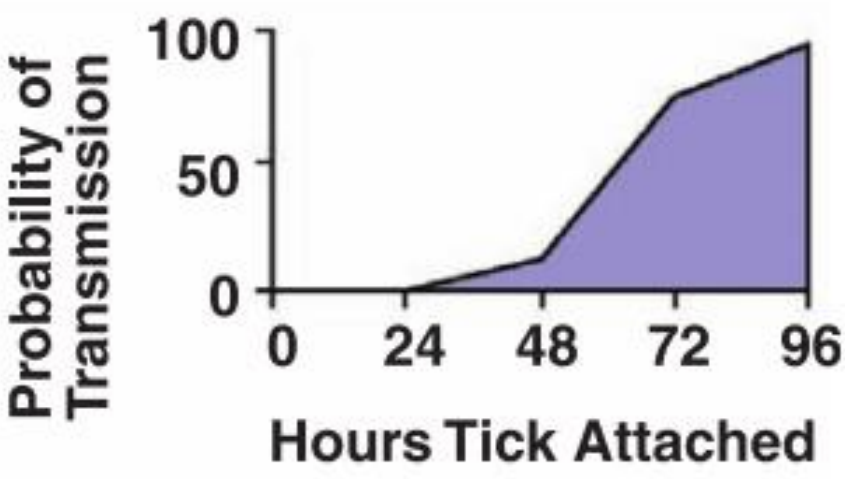


Tick Removal – Using a Tick Removal Spoon

	A tick removal spoon is an effective tool for removing ticks from both humans and pets. Place the spoon's notch on the skin near the tick. It can be used from any direction (the front, back, or side of the tick).
	Apply slight downward pressure on the skin and slide the spoon forward so the notch is framing the tick. Continue sliding the spoon forward to detach the tick (do not pry, lever, or lift up).
	Once the tick has detached, examine the bite site to make sure the mouthparts were completely removed. The tick can now be disposed of or saved for identification.
	After removing the tick, thoroughly clean the bite area, your hands, and the tick removal spoon with rubbing alcohol, an iodine scrub, or soap and water.

Get-of-of-jail card

•The risk of infection increase the longer an infected tick is attached.
•12% at 48 hours, see graph.
•During this time, spirochetes present in the mid-gut multiply and migrate to the salivary glands (do not squeeze!)



Plan B… Preventive Antibiotics

Preventive antibiotics work if…

- Attached tick is an adult or nymph deer tick.
- **Tick was attached for ≥36 hours** (by degree of engorgement or time of exposure).
- Prophylaxis is begun **within 72 hours** of tick removal.
- Local rate of infection of ticks with B. burgdorferi is ≥20 percent (true in much of Maine).
- Doxycycline is not contraindicated (>9 years of age, not pregnant or lactating).
- Recommended dose is doxycycline 200 mg

There is No Vaccine

- The LYMErix vaccine, which was approved in 1998 by the FDA for adults, is no longer available.
- The manufacturer withdrew the product from the market in 2002, citing insufficient demand.
- Mechanism: stimulated antibodies that attacked the Lyme bacteria in the tick's gut as it fed on the human host, before the bacteria were able to enter the body. 78% effective in protecting against Lyme infection after 3 doses.
- Lost in the court of public opinion.
- A new vaccine effective against both U.S. and European strains of Borrelia is being developed overseas.

Options to help prevent getting tick-borne diseases

1. Reduce your exposure to ticks
2. Reduce infection prevalence in ticks
3. Reduce the number of ticks

Things you can do to reduce your exposure to tick-borne diseases

- Strategies to prevent infection are effective
- **Protective clothes**: invest in 1+ outfit for intense outdoor activities (BugsAway, InsectShield, or DIY with Permethrin)
  - **Repellants**: use DEET on clothes/socks/shoes, exposed skin
  - **Shower** within 2 hours
  - do thorough **tick check daily** after being exposed
  - put clothes in hot dryer for 5 minutes to kill ticks on clothes
- If bitten, remove ticks carefully (don't squeeze) to avoid increasing risk of infection
- If tick is engorged, seek care and preventive treatment ASAP
- If tick exposure + flu-like symptoms or rash, seek care ASAP. Don't wait for rash.
- Antibiotics are most effective when started early.

Overview: Things communities might do

(not all items listed are effective or plausible)

- Target the environment/landscape:
  - Make public landscapes/trails/yards less hospitable to ticks and tick hosts.
  - Remove Barberry
  - Introduce/encourage species that eat ticks (guineafowl, etc)
  - Spraying chemical insecticides to control ticks
  - Biological & 'natural' control: Use of fungal pathogens and plant extracts as biopesticides to control ticks.
- Target the ticks on the mice/other rodents that carry diseases:
  - Rodent bait boxes: Attract mice and treat them with acaricide (same as found in pet products). Kills ticks on rodents
  - Tick tubes: Permetrin-treated cotton balls tucked into cardboard tubes. Mice use cotton balls for nesting material, which kills ticks.
- Target the ticks on the deer:
  - Treat the deer with acaricide (kills ticks on deer).
    - A 4-poster' feeding station that attracts deer and as they feed they either brush against rolling posts that apply acaricide to their bodies or eat ivermectin-treated corn (also deworms deer).
- Target the deer:
  - Reduce the deer population to lessen chance of adult ticks reproducing.
    - <20 deer per square mile appears to be effective to reduce disease (multi-deer permit for local hunters

Conclusion

- No grizzlies, rattle snakes, gators, or mountain lions in Maine
- But deer ticks are pervasive most of the year
- Most deer ticks are now infected with ≥ 1 serious diseases
- Problem is getting worse (global warming)
- If you don't take precautions, odds are you will be infected
- Strategies to prevent infection are effective and easy
  - Clothes: invest in 1 outfit for intense outdoor activities
  - Repellants: use DEET on clothes
  - Do thorough tick checks after being exposed
- Remove ticks carefully to avoid increasing risk of infection
- If tick is engorged, seek care and preventive treatment ASAP
- If tick exposure + flu-like symptoms or rash, seek care ASAP.
- Treatment is most effective when started early.