

*School intervention for vectorborne diseases in Maine:
Program to educate grades 3-8 on tickborne diseases and prevention methods*

No Ticks for ME!

Maine Center for Disease Control and Prevention



DON'T LET THE TICKS BITE!

OVERVIEW:

Tickborne illnesses present in Maine include Lyme disease, anaplasmosis, babesiosis, *Borrelia miyamotoi*, and Powassan. Lyme disease is the most common tickborne illness in Maine and is found in all 16 counties. Children in Maine ages 5-14 are a high-risk group for Lyme disease.

The Public Health Educators within Maine Center for Disease Control and Prevention's (Maine CDC) Infectious Disease Epidemiology Program designed the school-based intervention to educate 3rd-8th grade students in Maine. The program is evaluated annually and has been used in schools throughout Maine.

This program provides educators with tools concerning tick biology, germs/pathogens that can be passed/transmitted by ticks and the diseases they cause, and instruction on ways to decrease the risk of tick bites.

GOALS: The goals of this lesson are to:

- Increase students' ability to differentiate between deer ticks and dog ticks
- Increase students' ability to identify the symptoms of tickborne diseases
- Increase student's ability to demonstrate knowledge of methods of preventing tick bites

LEARNING OBJECTIVES: After completing this lesson, participants will have or be able to:

- Knowledge of tick biology and ecology
- Knowledge of the germs/pathogens ticks can pass/transmit to people and animals and symptoms of the diseases they can cause
- Demonstrate personal protection methods
- Demonstrate proper tick removal

STRATEGIES/METHODS:

- Facilitator/lecture presentation
- Hands-on group activities
- Individual activity booklet
- Class discussion
- Demonstrations
- Take-home sheet

MATERIALS NEEDED:

- | | |
|--|---|
| <input type="checkbox"/> Computer | |
| <input type="checkbox"/> Projector | <input type="checkbox"/> Stop-watch |
| <input type="checkbox"/> "No Ticks for ME!" PowerPoint presentation with facilitator notes and vocabulary lists (approx. 20 minutes) | <input type="checkbox"/> Tick Samples |
| | <input type="checkbox"/> Tick Removal Kit (recommended) |



SUPPLEMENTAL ACTIVITIES AND MATERIALS:

- Small Group Activities Instructions
 - TICK-tac-toe (10 min)
 - Pack a Backpack Relay (10 min)
 - Tick ID Walk (10 min)
 - Tick Identification (10 min)
 - Lyme Disease Awareness Poster
 - Tick Tag
- Tick Removal Kit
- Tick Activity Book
 - Tick Fun Facts
 - Tick Vocabulary
 - Find the Hidden Tick Message
 - Tick Word Search
 - What Would You Do?
 - Tick Take-Home Sheet

PREPARATION NEEDED:

- Gather supplemental activities
- Make copies of take-home sheet and activity book

RECOMMENDED FORMAT

Maine CDC recommends presenting the “No Ticks for ME!” in one-session. Changes can and should be made with the program to accommodate class schedules and needs.

- 1) Present “No Ticks for ME!” PowerPoint presentation
- 2) Break into small groups for activities
 - a. Group size is suggested to be 10 students or less
 - b. Parent volunteers or teaching aides may be helpful in the small group setting
 - c. Each activity is designed to take approximately 10 minutes so students can rotate through each activity
- 3) Distribute Tick Activity Book and Take-Home Sheet and encourage students to share information with their families

This presentation fits nicely with the “Fight the Bite!” education curriculum as there are common skills learned in both curricula.

TOTAL INSTRUCTIONAL TIME:

60 minutes

MAINE LEARNING RESULTS

Health Education	Science and Technology
A1, A3, A4, C2	E1, E4

FEATURES OF THE PROGRAM

- Free
- Downloadable and printable presentation
- Downloadable and printable activity books
- Downloadable and printable small group activity instructions



Introduction and Overview

1. Purpose of this program:

- The purpose of this program is to understand that ticks can carry pathogens that can cause disease and how we can prevent contact with ticks and getting those diseases. Ticks can cause several diseases in humans and animals. The most common disease in Maine that is associated with ticks is Lyme disease, but there are several other pathogens that are also found in Maine. Young people are at high risk for getting a disease from a tick bite.

2. Sequence of the lesson:

- The program starts with a presentation on ticks, what they look like and where they can be found, the pathogens they can carry, and how to prevent the diseases these pathogens cause. Then participants are broken up into small groups to do supplemental activities.

3. Encourage questions and conversation:

- Encourage participants to ask questions as they come up. Encourage students to discuss this information with their parents at home.

Slide Notes

Note: This text accompanies a PowerPoint presentation, “No Ticks for ME!” As you read the text, there will be a note about which PowerPoint slides relate to that section of text. Definitions for vocabulary words (in bold) are included at the end of this Educator Guide.

As you read the text, alternate notes will be available for certain slides, designated Grades 3-5 and Grades 6-8, to provide age-appropriate explanations of complex topics.

Slide 2: Today we will learn...

Today we will learn...
<ul style="list-style-type: none">• What do ticks look like?• Are all ticks the same?• Where do ticks live?• Why remove a tick?• What is Lyme disease?• How will I know if I have Lyme disease?• How do I protect myself?• What if I find a tick on me?

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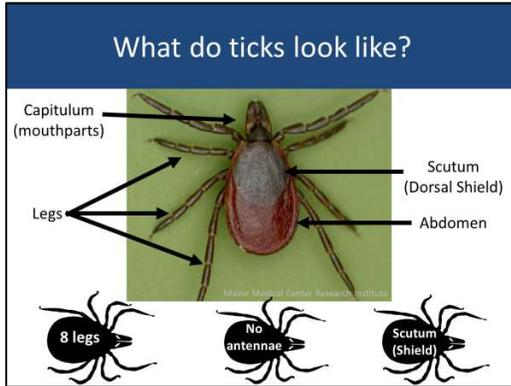
By the end of today, we will know the answers to all these questions.



Tick Biology

Slide 3: What do ticks look like?

There are 14 species of ticks that can be found in Maine, but only two of them regularly bite people. A **species** is a group of similar living things that are unlike any other group and can reproduce.



Ticks are **arachnids**. This means they are related to mites, spiders, and scorpions. Like spiders, they have 8 legs, do not have antennae, and have a flat, hard body.

Tick bodies are made up of three basic parts. They have a **capitulum**, which is the mouth of the tick. This is the part they use to bite. The shield just behind the head of the tick is called

the **scutum**. The **abdomen**, or stomach, of the tick is where the blood and germs (**Grades 6-8: pathogens**) are carried.

Slide 4: How do ticks bite?

Ticks have a **barbed** beak, which is called a **hypostome**. The hypostome gets inserted into the skin like a needle and has a lot of teeth that help hold it there. Ticks also make cement to help them stick in the skin.



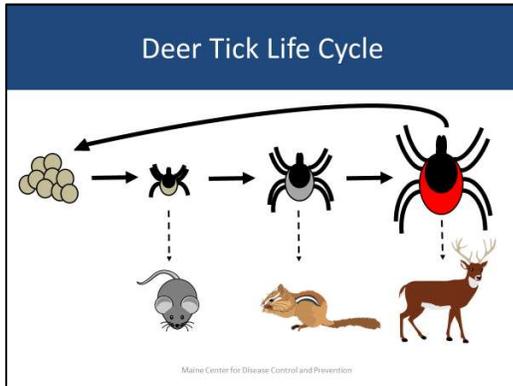
When a tick is biting you, it will spit saliva into your skin. This special saliva has blood thinning (**Grade 6-8: anticoagulant**) and numbing (**Grade 6-8: anesthetic**) properties so that you do not even notice that the tick is biting you. Since ticks need to be attached from 3-10 days to get a full meal, it is important that they keep you from knowing they are biting.

Slide 5: Deer Tick Life Cycle

Every tick has 4 life stages – egg, **larva**, **nymph**, and adult (male and female).

Eggs are laid in the **leaf litter** on the forest floor by a female who has had a large blood meal. The eggs will hatch into **larvae**, which are baby ticks. Larvae only have 6 legs, unlike the other stages of tick. They need to find a small animal, like a mouse, to feed on. Once they have enough blood, they will drop off the small animal and will grow (**Grade 6-8: molt**) into the next stage.



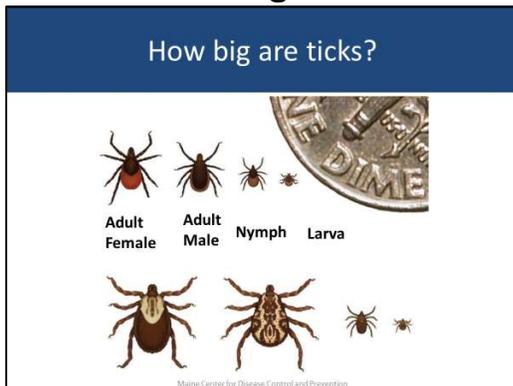


Larvae will grow/molt into **nymphs**, which are the teenage stage of the tick. They have 8 legs. Nymphs need to feed on an animal, like a chipmunk or human, and then drop off to grow/molt into an adult.

Adults can be male or female. Females need to feed on blood so that they can produce eggs. Adults will look for a large animal to feed on, like a deer, dog, or human, where the female can feed and mate. Once she is full of blood, the

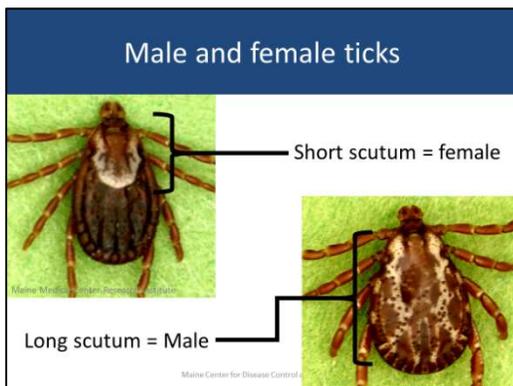
female will drop off and will lay eggs in the leaves on the forest floor. Once she is finished laying eggs, she dies, and the eggs will hatch into a new generation of baby ticks.

Slide 6: How big are ticks?



All tick larvae are tiny and very difficult to see. Adult male and female dog ticks are very common, but it is very uncommon to see dog tick nymphs or larvae. The adults are much bigger than deer ticks. It is common to see all 3 life stages of the deer tick.

Slide 7: Male and female ticks



You can tell male and female ticks apart by looking at scutum (shield) size.

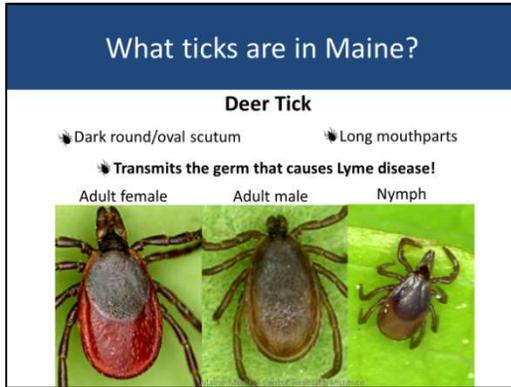
Since females need to swell up to hold a huge amount of blood, the scutum on their back needs to be small to allow their body to swell.

Males do not feed as much, so they can have a large decorative scutum covering their whole body, since they do not need to swell up.



Slide 8: What ticks are in Maine?

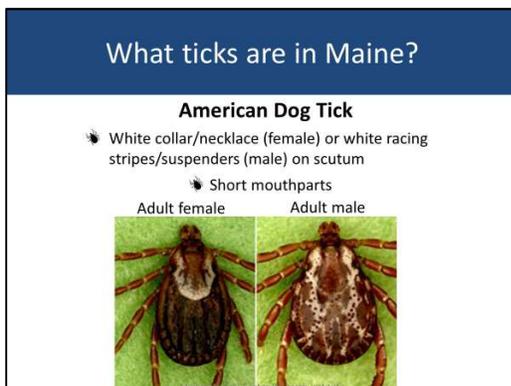
Deer ticks can pass (**Grade 6-8: transmit**) the germs/pathogens that cause Lyme disease, anaplasmosis (ana-plaz-mosis), babesiosis (ba-beez-iosis), *Borrelia miyamotoi* (Boh-rel-ya me-ah-mow-tow-ee), and Powassan (Puh-woss-an).



Deer tick females have a black scutum/shield and a red colored abdomen. The adults are about the size of an apple or sesame seed. They are most active in October to December and March to May.

Deer tick nymphs, the immature or teenage form of the tick, are about the size of a poppy seed. They are mostly clear with a black scutum/shield. They are active from June through August.

Slide 9: What ticks are in Maine?

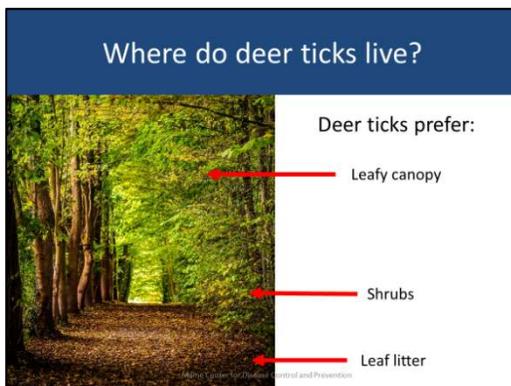


American dog ticks are a pest in Maine. While they can carry germs/pathogens in other parts of the country, they are not known to cause disease in Maine. They are larger than deer ticks and are active from April through July.

Dog ticks have white markings on their backs and very short mouthparts. The female looks like she is wearing a collar or necklace and the male looks like he has racing stripes or suspenders.

Tick Ecology

Slide 10: Where do deer ticks live?



Deer ticks prefer to live in protected environments like forests, rather than in open areas. They are more common in **deciduous** forests with trees that lose their leaves each year (such as oaks and maples).

Deer ticks can often be found in the leaf litter on the ground, where they can be protected from cold temperatures, sun, and wind.



Deer ticks can also be found in bushes and shrubs, which provide food and shelter for the **hosts** that the ticks need to feed on such as deer, mice, and birds.

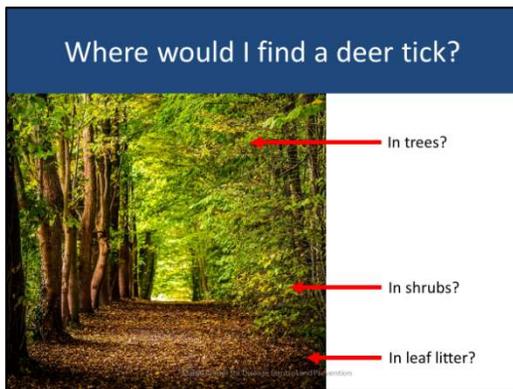
American dog ticks are tougher than deer ticks and can be found in grassy areas too.

Slide 11: Will I find a deer tick here?



Deer ticks do not like to live in open, dry habitats without any protection from the sun, wind, or **dehydration**.

Slide 12: Where would I find a deer tick?



Where do you think you might find a deer tick? Would you find them up in the tree branches? In shrubs or bushes? In the layer of leaf litter on the forest floor?

Slide 13: Where Would I find a deer tick? (Same as slide 12 with answers)

Ticks do not climb in tree branches, but they can be found in shrubs and bushes and in the leaf litter on the forest floor.

Slide 14: How do ticks move?



Ticks cannot jump or fly. They will wait to ambush a host on grasses, shrubs, or in leaf litter. In order to find a good host, ticks will **quest**, or wave their front legs in the air, to sense heat, moisture, movement, and **carbon dioxide** that humans and animals breathe out.

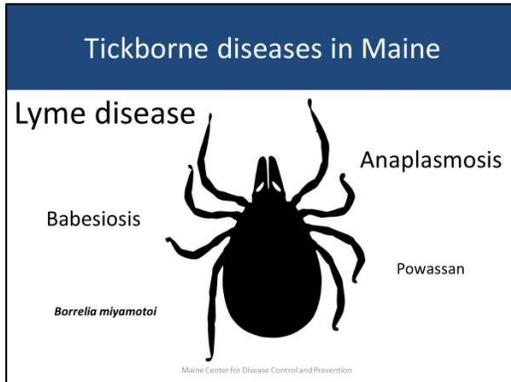
Once a host is near, the tick will grab onto clothing or fur as the host walks by (like a hitchhiker). Once the tick is on your body, it will crawl around looking for a good place to bite.



Tickborne diseases

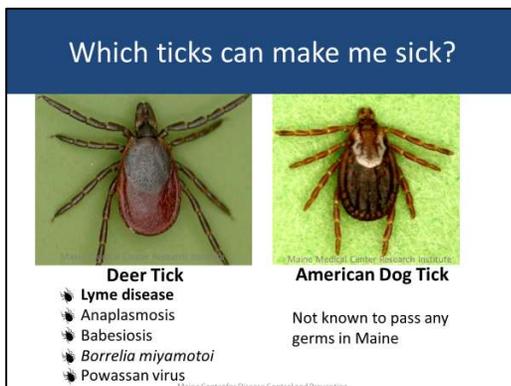
Slide 15 and 16: Tickborne diseases in Maine

What are some tickborne diseases that you have heard of?



Ticks can pass/transmit different germs/pathogens. Some ticks, like the deer tick, can carry more than one germ/pathogen. In Maine, ticks can cause **Lyme disease**, **anaplasmosis**, **babesiosis**, ***Borrelia miyamotoi***, and **Powassan**. Lyme disease is the most common tickborne disease in Maine.

Slide 17: Which ticks can make me sick?

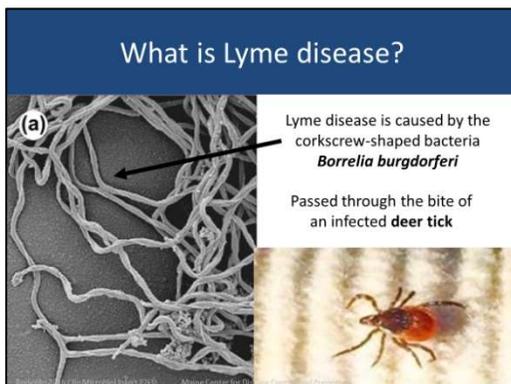


Remember, not all ticks carry the same germs/pathogens. This is why it is important to be able to identify your tick. American dog ticks are not known to carry germs/pathogens in Maine, but the deer tick is known to carry many germs/pathogens. The deer tick nymph is most likely to pass/transmit the germ/pathogen that causes Lyme disease to humans.

Not every deer tick that you see is infected. However, since we cannot tell the difference

between ticks that carry germs/pathogen and ticks that do not by sight, it is important to avoid being bitten by ticks.

Slide 18: What is Lyme disease?



Lyme disease is caused by a corkscrew-shaped bacteria called *Borrelia burgdorferi* (Boh-rel-ya burg-dor-fur-ee), which can pass from an infected deer tick into your body. The image on the left side is an up-close view of the bacteria.

Deer ticks get the bacteria by biting and feeding on infected animals. Not all animals and not all deer ticks are infected with the germ/pathogen.



Once a deer tick gets the bacteria, it is infected for the rest of its life.

People and pets can get sick with Lyme disease if they get bitten by a deer tick that carries this bacteria. The bacteria live in the belly of the tick. Once a tick bites, it takes 24-48 hours for the bacteria to wake up and move from the belly of the tick into a person.

Slide 19: How will I know if I have Lyme disease?

How will I know if I have Lyme disease?

People and pets can get sick

Symptoms

- Bull's-eye rash
- Sore muscles
- Very tired
- Chills, fever
- Headache
- Swollen lymph nodes

If you have any symptoms, see your doctor

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The most common symptom of Lyme disease is the “**bull’s-eye rash**” (**erythema migrans**). It looks like a bull’s eye or target with a dark red circle in the middle, clear area, and then lighter red circle around it.

The rash may not show up where the tick bit you, so you should check your whole body for a rash (including your back and head). Ask an adult for help if you need it. While some people may not

have a rash at all, others may have multiple rashes from a single tick bite.

Many people quickly develop a red area at the site of the tick bite. This red area is not the “bull’s-eye rash” but just a reaction to the tick bite. Depending on the person’s individual reaction, the red area may remain itchy for several days after removing the tick.

Along with the bull’s-eye rash, other symptoms include: swollen knees or other joints (arthritis), sore muscles (myalgia), fever, headache, and becoming very tired (lethargy).

If you are experiencing these flu-like symptoms during the summer months, you should tell an adult so they can contact your healthcare provider.

Slide 20: Symptoms of other tickborne diseases

Symptoms of other tickborne diseases

Anaplasmosis	All show similar symptoms:	• Fever
Babesiosis		• Headache
<i>Borrelia miyamotoi</i>		• Tiredness
Powassan		• Muscle or joint pain



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Anaplasmosis, babesiosis, *Borrelia miyamotoi*, and Powassan all show similar flu-like symptoms. These include fever, headache, tiredness, and muscle or joint pain.

If you have these symptoms, you should also tell an adult so they can contact your healthcare provider.



Prevention

Slide 21: How can I protect myself?

You can still enjoy the outdoors by protecting yourself from ticks!

How can I protect myself?

- 1. Wear protective clothing**
 - Tuck pants into socks
 - Wear boots
 - Long pants and long sleeves
 - Light colored clothing
- 2. Use insect repellent**
 - DEET, Picaridin, IR3535, Oil of Lemon Eucalyptus
- 3. Avoid tick habitat**
 - Walk in middle of trails
 - Don't brush against bushes

The image shows a person's legs in blue jeans and white socks tucked into black boots, standing on a trail. To the right, several bottles of insect repellent are displayed, including brands like OFF!, Repel, and Cutter.

Wearing long pants and long-sleeved shirts will reduce the amount of uncovered skin that ticks can contact.

Tuck your pants into your socks to prevent ticks from getting on your legs under your pants.

Wearing light-colored (white, khaki, etc) clothing makes ticks easier to see as they crawl on you.

Use bug spray (**repellent**) that is approved by the **EPA (Environmental Protection Agency)** for repelling ticks.

The four types of EPA approved repellents for use on skin are: Picaridin, DEET, IR3535, and Oil of Lemon Eucalyptus. Permethrin is approved for use on clothing.

When using a repellent, it is very important that you follow the label instructions carefully. Each repellent works for a different amount of time, so make sure you pay attention to when you need to add more. Ask an adult if you need help.

Stay in the center of the trail when you are walking in the woods and avoid brushing up against shrubs and grasses where ticks may be waiting to ambush you.

Repellent Resource: <http://cfpub.epa.gov/oppref/insect/>

Slide 22: Tick Check Daily!

Tick Check Daily!

4. Perform a Tick Check!

- Head, hairline, neck, armpits, waist, between legs, thighs, behind knees

Check your pets, too!

They look a little something like this:  But their actual size is more like this: 

The diagram shows a human figure with red boxes highlighting the head, neck, armpits, waist, between the legs, thighs, and behind the knees. An arrow points from the text 'Perform a Tick Check!' to the figure.

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When you come inside, put your clothes in the dryer for ten minutes before washing them. The heat from the dryer will kill ticks that are hiding in clothing.

You should perform a **tick check** frequently while outdoors and again a few hours later.

To do this, use your fingertips and sight to check all over your body for ticks, especially on your head, along your hairline, neck, armpits, waist,

between your legs, thighs, and behind your knees.



Nymphs can be very small (the size of a poppy seed), so use your hands to feel your skin along with looking. Ticks can blend in with freckles too, so if you have a lot of freckles or moles, check to make sure none of them have legs!

Make sure to check your pets for ticks, too!

Slide 23: What if I find a tick on me?



(Grades 3-5: Tell a grown-up as soon as you notice a tick on your skin, so that they can help you take it off)

Use fine-tipped tweezers or a tick spoon to remove the tick.

Clean the area where the tick was attached with soap and warm water.

Do not use petroleum jelly, a hot match, nail polish, or other products to remove the tick. Your goal is to remove the tick as quickly as possible.

Do not worry if the tick's mouthparts remain in the skin. Once the mouthparts are removed from the rest of the tick, it can no longer pass/transmit the germs/pathogens that cause disease.

Ticks are difficult to kill and may climb back out if you simply put them in the trash or flush them down the toilet. To kill ticks, drop them into a small container of rubbing alcohol or put them in a sealed plastic bag.

Slide 24: Why remove a tick?



If you have a tick on you, it is important to remove the tick as soon as you notice it. It takes time for a tick to pass along germs/pathogens that can make you sick, so you want to remove it right away.



Slide 25: Can I make my yard safer?

What more can we do to keep ourselves safe from ticks?



You can reduce ticks in your yard by keeping the grass mowed and raking up piles of leaves.

Wood chips, gravel, or mulch can be placed between the woods and the grass in your yard as a dry barrier.

When the ticks cross the barrier to enter the yard, they are exposed to direct sunlight and are at risk of drying out (remember, ticks like moist areas).

This barrier also acts as a reminder to people that crossing the path puts them into tick habitat, where they may be at higher risk of having ticks bite them.

You can also remove plants and brush piles that attract deer and other animals to your yard that may carry ticks.

Questions and Feedback

If you have any questions about “No Ticks for ME!” or if you need additional educational materials, please contact the health educator at Maine CDC’s Infectious Disease Epidemiology Program by email at disease.reporting@maine.gov.

Other materials are available free of charge from Maine Center for Disease Control and Prevention.

Visit this link to view and order: www.maine.gov/dhhs/order



No Ticks for ME! Vocabulary List

Vocabulary All Grades

Vocabulary	Definition
Abdomen:	The stomach of the tick, which holds blood and germs/pathogens.
Anaplasmosis:	A tickborne disease caused by the bacterium <i>Anaplasma phagocytophilum</i> . Can be passed to humans through the bite of an infected deer tick.
Arachnid:	A group of related arthropods that include spiders, ticks, mites, and scorpions.
Babesiosis:	A tickborne disease caused by the parasite <i>Babesia microti</i> . Can be passed to humans through the bite of an infected deer tick.
Barb:	A point or pointed part that projects backwards.
<i>Borrelia miyamotoi</i>:	A tickborne bacterium that can be passed to humans through the bite of an infected deer tick.
Bull's-eye rash (Erythema migrans):	A red, expanding rash that looks like a target or bull's eye. This is the most common symptom of Lyme disease and can be found at the site of the tick bite or anywhere else on the body.
Capitulum:	Mouthparts of the tick.
Carbon dioxide:	The gas that all animals breathe out that can attract ticks.
Deciduous:	A type of tree that has leaves that fall every year.
Dehydration:	The loss of water from the body.
Environmental Protection Agency (EPA):	A federal agency devoted to protecting human health and the environment.
Host:	A living animal or plant that provides food or shelter for another organism.
Hypostome:	The mouth that the tick inserts into the host to feed on blood. It is needle-like and has many barbed teeth to keep the tick in place.
Insect Repellent:	A spray applied to the skin to prevent insect bites. "Bug spray"
Larva (Larvae):	The baby stage of the tick that hatches from the egg. Unlike nymphs and adults, larvae only have 6 legs.



Vocabulary	Definition
Leaf Litter:	The layer of fallen leaves at the forest floor that can give ticks a place to hide and stay away from bad environmental conditions.
Lyme disease:	The most common tickborne disease in Maine, caused by the cork-screw shaped bacterium <i>Borrelia burgdorferi</i> . Can be passed to humans through the bite of an infected deer tick.
Nymph:	The tiny, 8-legged pre-adult or teenage stage of the tick.
Powassan:	A tickborne disease caused by the Powassan virus. Can be passed to humans through the bite of an infected deer tick.
Quest:	The behavior ticks use to find a host by waving their front legs in the air to sense carbon dioxide and other chemicals coming from a host.
Scutum:	The shield portion of the tick located just behind the mouthparts. Made of bony material called chitin.
Species:	A unique group of animals, different from other groups.
Tick Check:	Using your finger tips and eyes to check your body closely for ticks. Should be done every time you come in from outdoors, especially if you have been in tick habitat.



Additional Vocabulary Grades 6-8

Vocabulary	Definition
Anesthetic:	A substance that causes the loss of sensation, used to relieve pain.
Anticoagulant:	A substance that keeps blood from clotting.
Molt:	The process that allows a tick to grow to the next life stage.
Pathogen:	Any microorganism or virus that can cause disease.
Transmit:	The movement of a pathogen from one organism to another

