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

Don't Let the Ticks Bite!

Maine Center for Disease Control and Prevention

Overview: DON'T LET THE TICKS BITE

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 students' 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 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:

- ☐ Computer
- ☐ Projector
- ☐ "Don't Let the Ticks Bite" PowerPoint presentation with facilitator notes (approx. 20 minutes)
- ☐ Stop-watch
- ☐ Tick Samples
- ☐ Tick Removal Kit (recommended)

SUPPLEMENTAL ACTIVITIES AND MATERIALS:

- ☐ Small Group Activities
    - TICK-Tac-Toe (approx. 10 minutes)
    - Pack a Backpack Relay Race (approx. 10 minutes)
    - Tick ID Walk (approx. 10 minutes)
    - Tick Identification (approx. 10 minutes)
    - Lyme Disease Poster
    - Tick Tag
- ☐ Tick Activity Book
    - Tick Fun Facts
    - Tick Vocabulary
    - Find the Hidden Tick Message

- Tick Word Search
- What Would You Do? Tick Activity

- Tick Removal Kit
- Tick Take-Home Sheet

PREPARATION NEEDED:

- Gather Supplemental Activities
- Make copies of take-home sheet and activity books

RECOMMENDED FORMAT

Maine CDC recommends presenting the “Don’t Let the Ticks Bite” in one-session. Changes can and should be made with the program to accommodate class schedules and needs.

1) Present “Don’t Let the Ticks Bite” 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!” mosquito education curriculum as there are common skills learned in both curricula.

TOTAL INSTRUCTIONAL TIME: 60 minutes

MAINE LEARNING RESULTS IN HEALTH EDUCATION: A1, A3, A4, C2

MAINE LEARNING RESULTS IN SCIENCE & TECHNOLOGY: E1, E4

FEATURES OF THE PROGRAM

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

DON'T LET THE TICKS BITE

ABOUT THE PROGRAM

Tickborne illnesses present in Maine include Lyme disease, anaplasmosis, babesiosis, Powassan, and *Borellia miyamotoi*. 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 Corps (PHC) 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.

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.

Introduction and Overview

1. Purpose of the program:

The purpose of this program is to understand that ticks can carry germs/pathogens and how you prevent getting the diseases they can cause.

Ticks can cause several diseases in humans and animals. The most common disease in Maine that is caused by ticks is Lyme disease. People your age are high risk for getting a disease from a tick bite.

2. Sequence of the lesson:

We'll start with a presentation on ticks, what they look like and where they're found, the germs/pathogens they can carry, and how to prevent the diseases these pathogens cause.

Then we will break up into small groups and do activities.

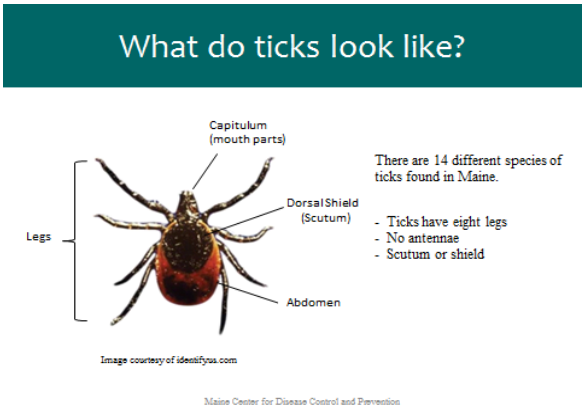
3. Encourage Questions and Conversations:

You're going to learn about ticks and how you can keep yourself safe and healthy from them. Don't be afraid to ask questions. When you go home today be sure to talk to your family about what you learned.

Before you begin, ask students whether any of them have had a tick on them and where they were when it happened.

This text accompanies a PowerPoint presentation, “Don’t Let the Ticks Bite” As you read the text, there will be a note about which PowerPoint slides relate to that section of text.

Each slide includes a list of definitions for new vocabulary.



Tick biology

1. What do ticks look like? (Slide 3)

There are 14 different species of ticks found in Maine.

Ticks are arachnids—along with mites, spiders, and scorpions.

Ticks have eight legs, no antennae, and a flat, hard body. They have a mouthpart **(capitulum)**, a shield near the back of the head **(scutum)**, and a stomach **(abdomen)** which is where germs/pathogens are carried. Ticks start off hatching from eggs and grow larger as they get older.

Vocabulary All Grades:

- **Capitulum** – mouthparts
- **Scutum** – “shield”, a bony, horny, or chitinous plate; part of the back of the tick near the head
- **Abdomen** – stomach, carries germs/pathogens

2. How do they bite me? (Slide 4)

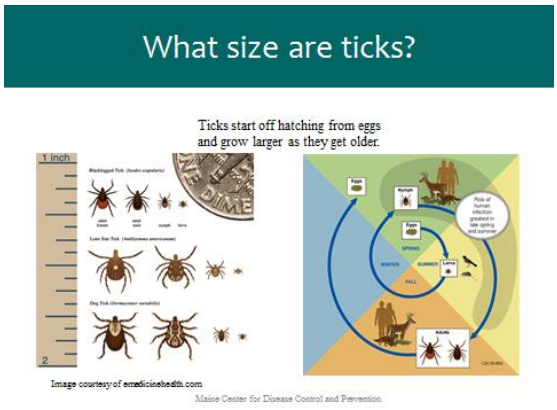
Ticks have a **barbed** beak that allows them to attach to your skin. The tick’s saliva has blood thinning **(anticoagulant)** and numbing **(anesthetic)** properties so that you do not even notice they are biting.

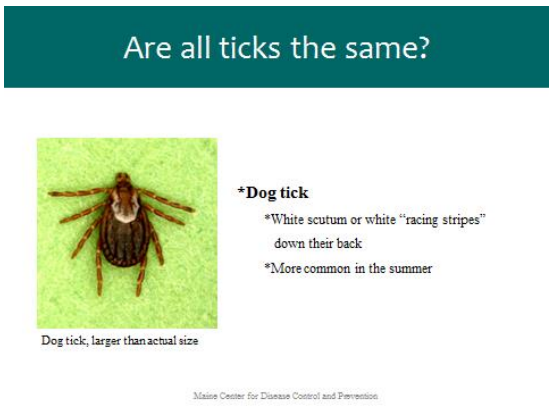
Vocabulary All Grades:

- **Barb**—a point or pointed part projecting backward

Vocabulary Grades 6-8:

- **Anesthetic**—a substance causing loss of sensation/pain reliever. The tick has anesthesia in its saliva to





numb your skin so you don't know it is starting to bite.

- **Anticoagulant** A substance that keeps blood from clotting.

3. What size are ticks? (Slide 5)

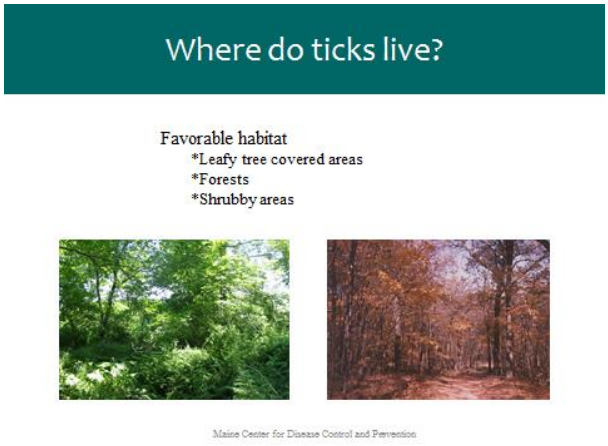
Ticks are different sizes at different stages in their lives.

4. Are all ticks the same? (Slide 6 and 7)

The two most common ticks in Maine are deer ticks (also known as Black Legged Ticks) and dog ticks. Deer ticks can pass/transmit the germ/pathogen that causes Lyme disease, anaplasmosis, babesiosis, Powassan, and *Borellia miyamotoi.* Dog ticks cannot pass/transmit the germs/pathogens that can cause these illnesses, so it's a good idea to know the difference.

These are some of the key differences between deer ticks and dog ticks:

- Deer tick females have a black scutum—the part on the back near the head—and a reddish abdomen/belly.
- The immature or child-like stage of a tick (**nymphs**) are about the size of poppy seed and are active from June through August, while the adults are a bit larger (about the size of an apple seed) and are active from October to December, and March to May.



Dog ticks are a pest in Maine. They are not known to cause diseases in Maine but in other parts of the country they can carry germs/pathogens that cause diseases. They are larger than deer ticks and are active from April through July.

Dog ticks have white markings on their backs. To tell the difference between dog ticks and deer ticks, it's a good idea to look for the whitish markings.

Vocabulary All Grades:

- **Nymph** – pre-adult stage of the tick life cycle; very tiny, about the size of a poppy seed, so they can be difficult to see

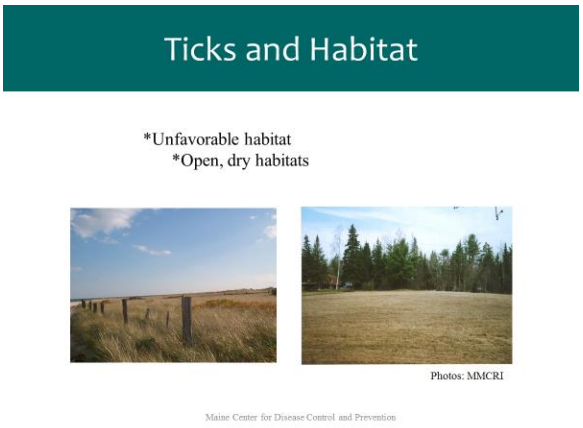
Tick ecology

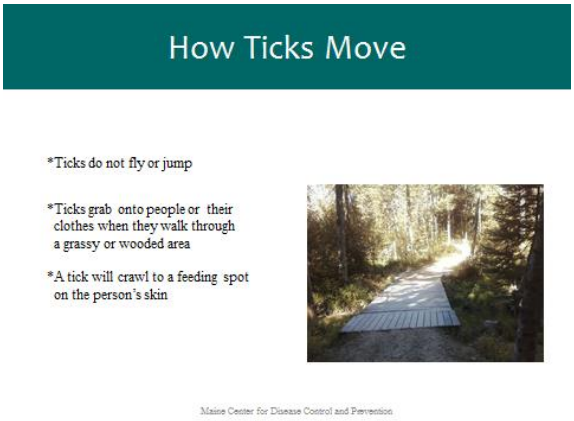
5. Where do ticks live? (Slide 8 and 9)

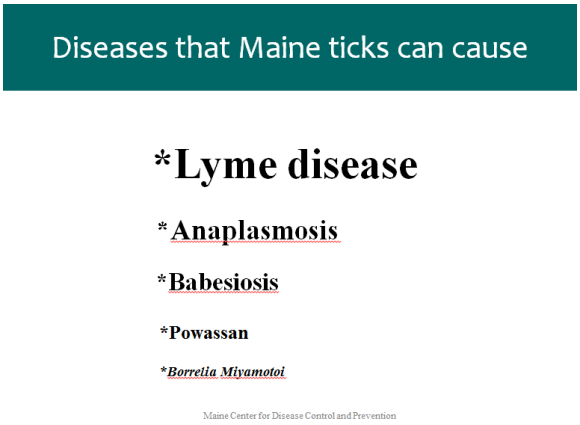
Deer ticks prefer protective environments, like forests and forest edges. They are more common in forests with trees that lose their leaves seasonally such as oaks and maple trees because they make a thick leaf layer as shelter for them.

Deer ticks are also found in groups of bushes, which provide food for the animals ticks attach to and feed on (**hosts)**, such as deer, mice, and birds. The bushes also protect the ticks from being dried out by the sun and wind. Generally, deer ticks prefer woods, while dog ticks prefer grassy meadows.

Ticks do not like open, dry habitats where there is no protection from the sun and wind. Ticks like moist areas.







These examples show areas unsuitable for deer ticks; there is no protection for the ticks from the sun and wind.

Vocabulary All Grades:

- **Host** – a living animal or plant that provides food or shelter for another organism

6. How do ticks move? (Slide 10)

Ticks cannot jump or fly so they will wait on grasses and shrubs for a person or animal to brush up against them. They grab onto clothing or fur when someone walks by (like a hitchhiker). Once the tick is on your body, it will crawl around to find a good place to feed.

Diseases ticks can cause in people and animals and symptoms of these diseases

7. Diseases that Maine ticks can cause (Slide 11)

Different ticks can pass/transmit different germs/pathogens and some ticks, such as the deer tick, can carry more than one disease-causing germ/pathogen.

Maine ticks can cause: **Lyme disease**, **anaplasmosis** (ANA-PLAZ-MOSIS), **babesiosis** (BA-BEEZ-IOSIS), **Powassan** (PUH-WOSS-AN), and ***Borrelia miyamotoi***. It is important to note two things:

1) Not all types of ticks carry germ/pathogens that can make you sick, and

2) Not all deer ticks carry the germ/pathogen that causes Lyme and other diseases.

Vocabulary All Grades:

- **Lyme disease** – tickborne disease caused by the bacterium *Borrelia burgdorferi*
- **Anaplasmosis** – tickborne disease caused by the bacterium *Anaplasma phagocytophilum*
- **Babesiosis** – tickborne disease caused by the parasite *Babesia microti*
- **Powassan** – tickborne disease caused by the Powassan virus
- ***Borrelia miyamotoi*** – tickborne disease, caused by the bite of an infected deer tick.

8. What is Lyme disease? (Slide 12)

The scientific name for the bacteria that causes Lyme disease is *Borrelia burgdorferi*, which can pass from the tick into your body. The image on this slide is a microscopic view of the bacteria. Ticks can get the bacteria by biting and feeding on mice, birds, and other small animals that have the bacteria.

Note that not all animals and not all ticks carry the bacteria that can cause Lyme disease. Once a tick gets the bacteria it has it for the rest of its life. People and pets can get sick if they get bitten by a tick that carries these bacteria.

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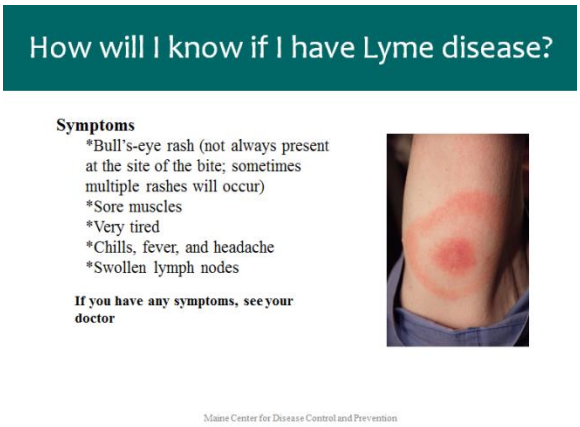


The germs/bacteria that can cause Lyme disease are in the belly of the tick

It takes 24-48 hours for the bacteria to go from the belly of the tick and into a person after the tick starts feeding on your blood.

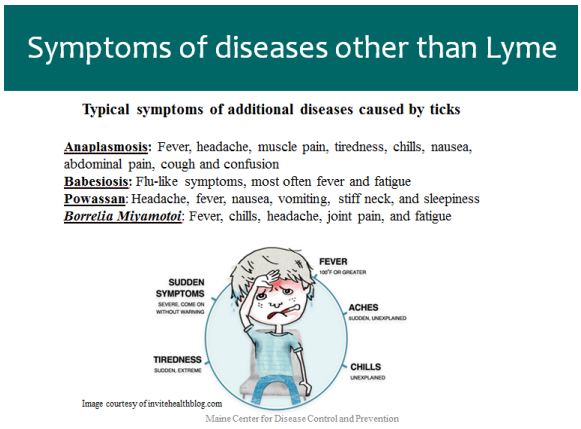
Many people, when bitten by a deer tick, quickly develop a red area at the site of the bite. This red area is not the 'bull's-eye rash' (which we'll discuss more shortly) but just a reaction to the tick bite. Depending on the person's individual sensitivity, the red area may remain itchy for several days after removing the tick.

9. How will I know if I have Lyme disease? (Slide 13)

Different symptoms of Lyme disease can be present but the most common is the **'bull's-eye rash' (erythema migrans).** It looks like a bull's-eye or a target with a dark red circle in the middle, a clear area, and then a lighter red circle surrounding it. The rash may not show up where the tick bit you, so it is important to check your whole body (including the back and head).

While some people do not have a rash at all, others might have multiple rashes from a single bite.

You can also have swollen knees or other joints, sore muscles, or become very tired.



If you are experiencing flu-like symptoms (like those mentioned above) during the summer months, you should contact your provider.

Vocabulary All Grades:

- **Bulls-eye rash (erythema migrans)**– a red, expanding rash that looks like a target or a bull's eye. This is the most common symptom of Lyme disease.

10. Symptoms of diseases other than Lyme. (Slide 14)

Anaplasmosis, babesiosis, Powassan, and *Borelia miyamotoi* all have different symptoms to be aware of.

Anaplasmosis can cause fever, headache, muscle pain, tiredness, chills, nausea, abdominal pain, cough and confusion.

Babesiosis can cause flu-like symptoms, most often fever and fatigue.

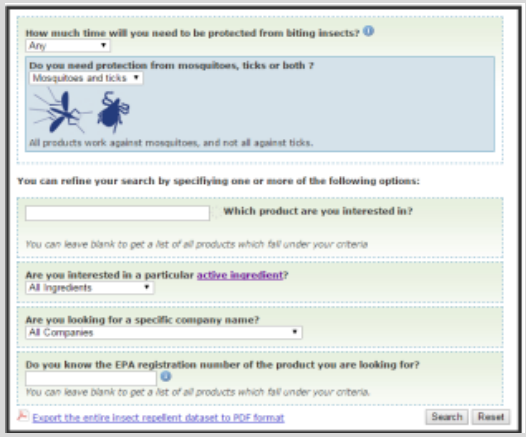
Powassan can cause headache, fever, nausea, vomiting, stiff neck, and sleepiness.

Borrelia miyamotoi can cause fever, chills, headache, and joint pain.

If you have these symptoms you should also check with your doctor.

NOTE: Educators are encouraged to show this website to students and scroll down the page to the section Search for a Repellent that is Right for You and search repellents that repel both ticks and mosquitoes)

http://cfpub.epa.gov/oppref/insect/



Tick bite prevention methods

11. How do I protect myself? (Slide 15)

Wear long pants and long-sleeved shirts to reduce the amount of your skin that is uncovered. Tuck your pants into your socks to form a barrier to your skin. Light-colored clothing makes ticks easier to see.

- 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, follow the label instructions carefully. You can find the repellent that will work best for you here: http://cfpub.epa.gov/oppref/insect/

- Since ticks cannot jump, they wait for you to brush up against them so they can attach to you. When you are walking in the woods, stay in the center of the trail so you do not brush up against grasses and bushes where ticks are waiting.

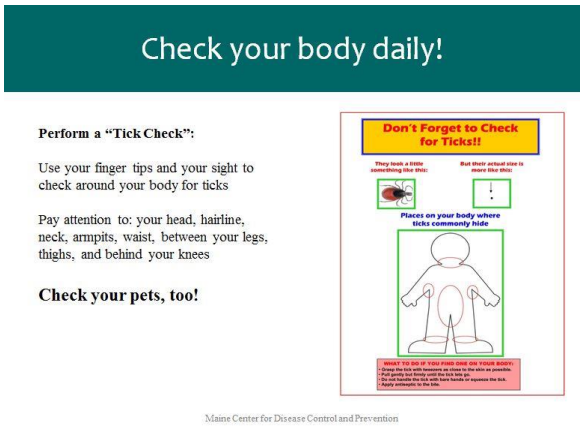
- After coming inside, you can place your clothes in a dryer for ten minutes. Laundry detergents alone will not generally kill ticks, but the heat from the dryer will kill ticks that might be on clothing. The clothes may then be washed to remove ticks from them.

- Perform a **tick check** after leaving a tick habitat and at least daily. Check your body for ticks, looking particularly for what may look like nothing more than a new freckle or speck of dirt.

Remember, ticks need to feed for at least 24 hours in order to pass/transmit the bacteria that can cause Lyme disease, so quick removal can prevent Lyme disease.

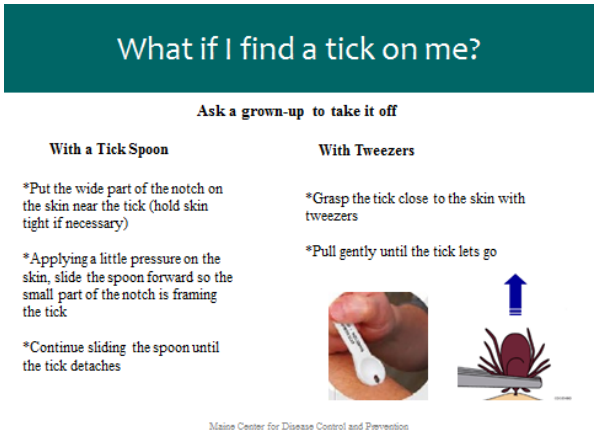
Vocabulary All Grades:

- **Repellent** – a spray applied to skin to prevent insect bites
- **EPA** (Environmental Protection Agency) – federal agency devoted to protecting human health and the environment
- **Tick check**– use your finger tips and your sight to check around your body for ticks; it is recommended to do tick checks every time you come in from the outdoors, especially if you have been in a tick habitat.



12. Check your body daily! (Slide 16)
Perform a "Tick Check" – inspect your body after being outdoors, and again a few hours later.

Ticks like damp, dark places so pay attention to your head, hairline, nape of the neck, armpits, waist, between your legs, thighs, and behind the knees. Check your pets, too.



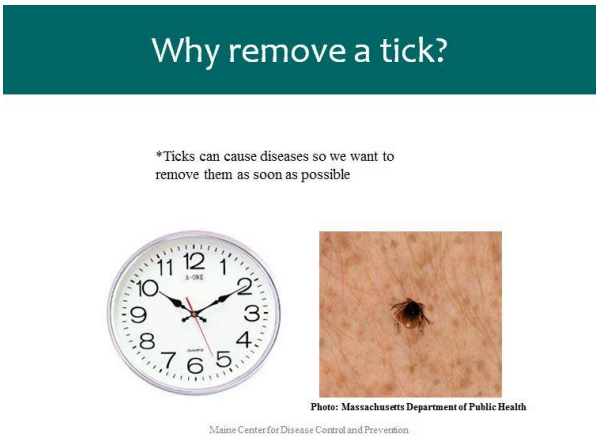
Nymphal ticks can be very small (the size of a poppy seed), so use your hands to feel your skin along with a close visual inspection. Ticks can blend in with freckles too, so if you have a lot of freckles or moles, check to make sure none of your freckles have legs!

Proper tick removal

13. What if I find a tick on me? (Slide 17)

(3-5 graders) 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 your skin with soap and warm water.
- **Do not** use petroleum jelly, a hot match, nail polish, or other products to remove a tick. These will only upset the tick and may cause it to vomit what's in its stomach back into your body, which can cause irritation.
- **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 pathogens that cause disease.
- Ticks are difficult to kill, and may climb back out if you simply put them in the trash. To kill ticks, drop them into a small container of rubbing alcohol.



QUESTIONS AND FEEDBACK

If you have any questions about "Don't Let the Ticks Bite" or if you need additional educational materials, please contact Maine CDC 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 order:

http://www.maine.gov/dhhs/mecdc/infectiousdisease/epi/order-form-wn.shtml

14. Why remove a tick? (Slide 18)

If you have a tick on you, it is important to remove the tick from you 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.

15. Make your yard safer (Slide 17)

- 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 piles of leaves.
- Wood chips, gravel, or mulch can be placed between the woods and the grass in your yard as a barrier. When the ticks cross the path to enter the yard, they would be in direct sunlight and therefore at risk for drying out (remember, ticks like moist areas).
- The barrier also acts as a reminder to people that crossing the path puts
- them into the wooded area, where they may be at higher risk of having ticks bite them.
- You can also remove plants that attract deer and other animals to your yard that might carry ticks.

Vocabulary Grades 6-8:

- **Infectious**: a disease or disease causing pathogen that can be spread
- **Epidemiology**: The study of the spread and causes of disease.