



# TICKS AND TICKBORNE DISEASE

Tick Bite Prevention Tips to  
Reduce Your Risk



**PennState Extension**

Many species of ticks occur in Pennsylvania. The most common are black-legged (deer) ticks, American dog ticks, lone star ticks, and groundhog ticks.

Ticks can transmit pathogens that cause disease in humans and animals. The most recognizable of these diseases is Lyme disease, which is caused by *Borrelia burgdorferi*, a member of the family of corkscrew-shaped bacteria known as spirochetes, and transmitted by blacklegged ticks.

Other pathogens may be carried by ticks and transmitted at the same time. It is possible to have multiple infections from different pathogens.

This pamphlet includes basic information about ticks and how to protect yourself and your family from tick bites.

## TICK SPECIES IN PENNSYLVANIA

Three species of ticks are frequently encountered in Pennsylvania: blacklegged ticks, American dog ticks, and lone star ticks. The first two species are found throughout the state, whereas lone star ticks are currently limited to the extreme eastern and southern regions, although this distribution may be changing.

Different tick species can transmit different pathogens. It is important to remember that ticks can look different based on species, sex, life stage, and how long they have been blood feeding. If you have questions about the identification of a tick, specimens can be preserved in the freezer and sent to the Insect Identification Laboratory at Penn State.

### Blacklegged Tick (*Ixodes scapularis*)



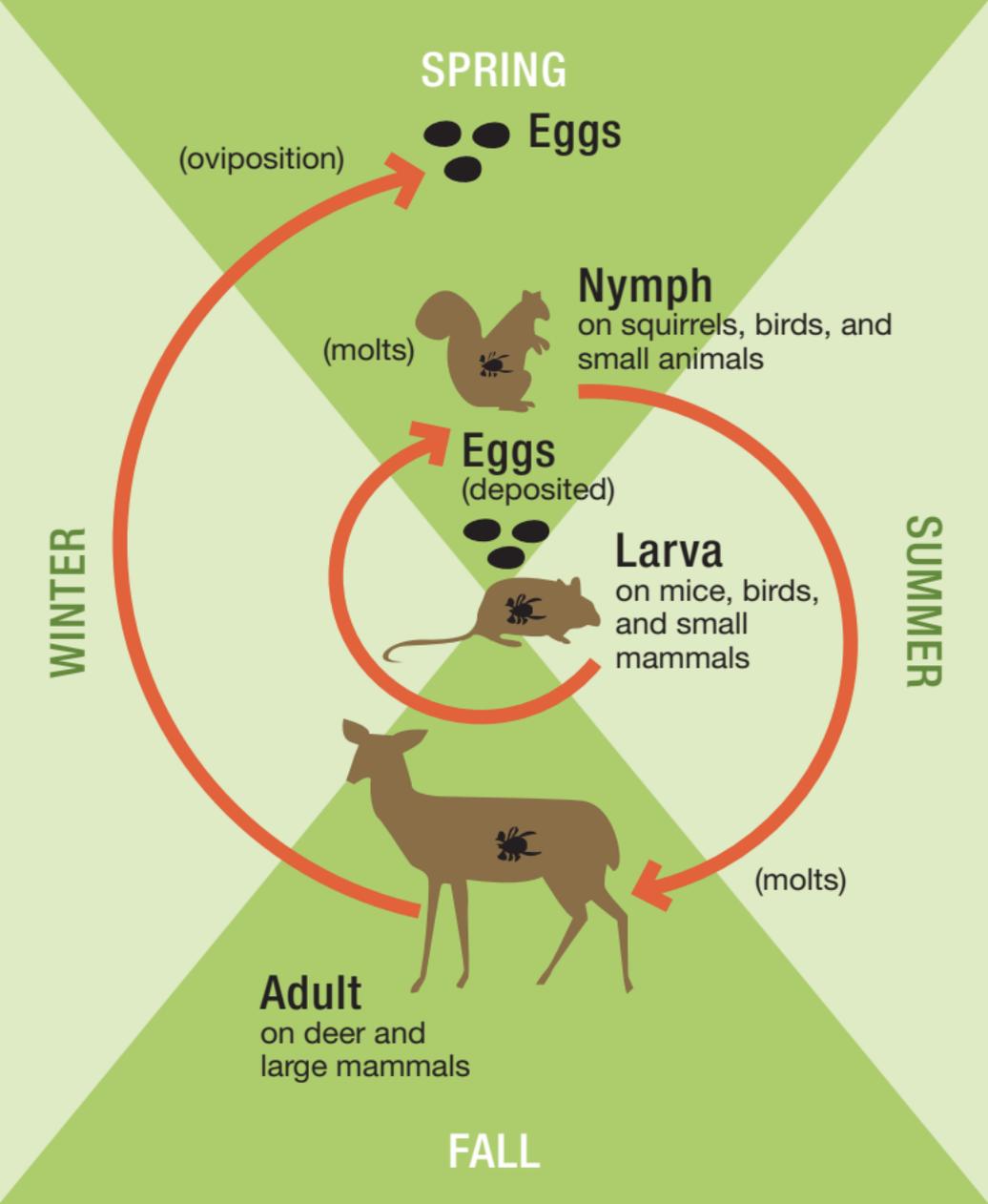
### Lone Star Tick (*Amblyomma americanum*)



### Dog Tick (*Dermacentor variabilis*)



**NOTE:** Relative sizes of several ticks at different life stages. Images courtesy of the Centers for Disease Control and Prevention



## TICK BIOLOGY AND LIFE CYCLE

Ticks are not insects. They are arachnids with eight legs and related to mites and spiders. The most common ticks biting people in Pennsylvania are “2 + 3,” meaning they have a two-year life cycle and are three-host ticks. They go through four life stages during this two-year cycle: egg, larva, nymph, and adult. A blood-fed female lays eggs in the spring. Later in the summer these eggs hatch into larvae, which feed on many small animals. After feeding, they drop off and overwinter in the soil and leaf litter. The next spring, the larvae molt into nymphs. Nymphs take another blood meal on a small or medium-sized animal or may bite large animals like humans. Once again, after feeding nymphs drop off the host and molt into adults in the fall. Adult ticks feed primarily on large animals. Adult ticks are active throughout the fall and winter when temperatures are above freezing.

# PATHOGENS TRANSMITTED BY TICKS

Blacklegged ticks can transmit pathogens that cause Lyme disease, anaplasmosis, babesiosis, and bartonella. American dog ticks can carry the pathogens that cause Rocky Mountain spotted fever and tularemia. Pathogens that cause ehrlichiosis, tularemia, tick-associated meat allergy, and southern-tick-associated rash illness can be transmitted by lone star ticks. Blacklegged ticks and American dog ticks can transmit Powassan virus.

The pathogens that cause Lyme disease and other tickborne diseases are zoonotic, meaning they naturally infect animals and can be transmitted to people. However, tickborne pathogens are only transmitted by the bite of an infected tick.

## LYME DISEASE

Lyme disease is a bacterial infection that is transmitted to people by the blacklegged tick. This condition was first identified in Lyme, Connecticut, after a group of children were diagnosed with juvenile arthritis. Since then, case numbers of Lyme disease have continuously increased, and the range has spread. Pennsylvania ranks first in number of Lyme disease cases and third in incidence (total cases per 100,000 people).

Lyme disease is caused by *Borrelia burgdorferi*, a member of the family of corkscrew-shaped bacteria known as spirochetes. Infection can cause fever, malaise, joint pain, and many other symptoms.

### Reported Cases of Lyme Disease, United States, 2016

Image courtesy of the Centers for Disease Control and Prevention

Each dot represents one case of Lyme disease and is placed randomly in the patient's county of residence. The presence of a dot in a state does not necessarily mean that Lyme disease was acquired in that state. People travel between states, and the place of residence is sometimes different from the place where the patient became infected.



## TICK PREVENTION

### PROTECT YOUR HOME

Help reduce ticks in the landscape by removing leaves, clearing brush and tall grasses, and removing small animal harborages such as rock walls and wood piles. Keeping grass mowed and providing a 3-foot barrier of wood chips or stone between lawn and wooded edges can also reduce tick presence.

Applying acaricides (chemicals that are toxic to ticks) to gardens, lawns, and the edge of woodlands near homes may be advisable in some situations. Currently, no commercial essential oil products have demonstrated long-term effectiveness against ticks. In addition, several of the formulations may be toxic to pollinators and soil organisms.

Various synthetic pyrethroid and carbamate active ingredients are effective acaricides; however, consideration should be given to impacts on nontarget organisms. All applications must adhere to the label instructions. A licensed professional pest control expert should supervise application to residential properties.



#### 1 Tick Zone

Avoid areas with forest and brush where deer, rodents, and ticks are common.

#### 2 Wood chip barrier

Use a 3ft. barrier of wood chips or rock to separate the "tick zone" and rock walls from the lawn.

#### 3 Wood pile

Keep wood piles on the wood chip barrier, away from the home.

#### 4 Tick migration zone

Maintain a 9 ft. barrier of lawn between the wood chips and areas such as patios, gardens, and play sets.

#### 5 Tick safe zone

Enjoy daily living activities such as gardening and outdoor play inside this perimeter.

#### 6 Gardens

Plant deer resistant crops. If desired, an 8 ft. fence can keep deer out of the yard.

#### 7 Play sets

Keep play sets in the "tick safe zone" in sunny areas where ticks have difficulty surviving.



## PROTECT YOURSELF

Be aware when you are in tick habitat and take preventive measures. Stay close to the center of trails and avoid areas with dense vegetation. Be especially cautious from May through July when nymphs are seeking hosts.

Blacklegged ticks do not jump or fly but crawl onto people and animals from the ground or low vegetation. Tucking your pants into your socks makes ticks crawl over the pants rather than under them. This increases the chances you will see the ticks before they bite. Permethrin-treated clothing can provide a repellent barrier between you and ticks. Apply products containing DEET, picaridin, or IR3535 on skin as recommended by the Centers for Disease Control and Prevention.

Conduct frequent tick checks while in the field and full-body tick checks after you come indoors. While ticks can attach anywhere, they often prefer tight areas, such as around the waistband, behind the knee, and under the armpit. All clothing should be laundered in hot water and dried a hot cycle to kill any ticks.

If an embedded tick is found, remove it with fine tweezers by grasping the head as close to the skin as possible and pulling with steady, firm pressure. Do not grab the tick in the middle of its body. Pressure can force gut contents into the skin, increasing the likelihood of infection. The use of matches, chemicals, petroleum jelly, and essential oils is **not** recommended. These methods will irritate the tick and may cause it to regurgitate its stomach contents, thereby increasing the possibility of infection.

## TICK IDENTIFICATION

Identification services are provided free of charge to Pennsylvania residents. Specimens can be taken to county Penn State Extension offices for identification. If necessary, local extension educators will forward the sample to the Insect Identification Laboratory.

### SAMPLES CAN BE MAILED TO:

Insect Identification Laboratory  
Department of Entomology  
The Pennsylvania State University  
501 Agricultural Science and Industries Building  
University Park, PA 16802

Prepare specimens for mailing by placing them in a small vial filled with rubbing alcohol or alcohol-based hand sanitizer and then place the vial in a plastic sandwich bag. Please include an address, phone number, or email address as well as some information about the specimen, such as where it was found.

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