Spring and summer bring warm temperatures, just right for walking in the woods and other outdoor activities. Warm weather also means that ticks become more active and this can increase the risk of a tick-borne disease. The tick-borne diseases that occur most often in Virginia are Lyme disease, Rocky Mountain spotted fever, and ehrlichiosis.

Lyme Disease

Lyme disease is caused by infection with a bacterium called *Borrelia burgdorferi*. The number of Lyme disease cases reported in Virginia has increased substantially in recent years.

The Tick

The blacklegged tick (*Ixodes scapularis*), formerly known as the deer tick, is the only carrier of Lyme disease in the Eastern U.S. The blacklegged tick's name comes from it being the only tick in the Eastern U.S. that bites humans and has legs that are black (or dark chocolate brown) in color.

Lyme disease transmission to humans usually occurs during the late spring and early summer when young (nymph stage) ticks are active and feeding. Tick nymphs normally feed on small and medium sized animals, but will also feed on people. These ticks typically become infected with the Lyme disease agent by feeding as larvae on certain rodent species.

In the fall, the nymphs become adults and infected nymphs become infected adults. Adult blacklegged ticks prefer to feed on deer. However, adult ticks will occasionally bite people on warm days of the fall and winter and can transmit Lyme disease at that time.

Transmission of Lyme disease by the nymph or adult ticks does not occur until the tick has been attached and feeding on a human or animal host for at least 36 hours.

The Symptoms

Between three days to several weeks after being bitten by an infected tick, 70-90% of people develop a circular or oval rash, called erythema migrans (or EM), at the site of the bite. To qualify as an EM, the rash must be at least two inches in diameter. That is because bites by some tick species can cause local inflammation and redness around the bite that could be mistaken for an EM. Unlike localized inflammation, an EM rash will increase in size and may become more than 12 inches across. As it enlarges, the area around the center of the rash clears, giving it a “bull's eye” appearance. The EM rash does not itch or hurt so if it is not seen, it may not be noticed. In addition to an EM rash, Lyme disease may cause headache, fever, muscle and joint aches, and a feeling of tiredness. If left untreated, Lyme disease may progress to affect the joints, nervous system, or heart several weeks to months after the tick bite. In a small percentage of infected people, late symptoms may occur months to years later and cause long-term nervous system problems or arthritis.

EM Rash

Unfortunately, blacklegged tick nymphs are small (about the size of a pinhead), difficult to see, and cause no itch or irritation at the site of the bite, so many people are not aware they have been bitten. If you have been in an area that might contain ticks and you experience any symptoms of Lyme disease, contact your doctor.

The Treatment

When Lyme disease is detected early, its effects can be mild and easily treated with antibiotics. In the late stages, Lyme disease can be treated successfully with antibiotics, but recovery may take considerably longer.

Rocky Mountain Spotted Fever

Rocky Mountain spotted fever (RMSF) is caused by infection with a bacterium called *Rickettsia rickettsii*. The disease is characterized by a sudden onset of symptoms and can be fatal if not treated. Nearly all cases occur in the spring and summer months.

The Tick

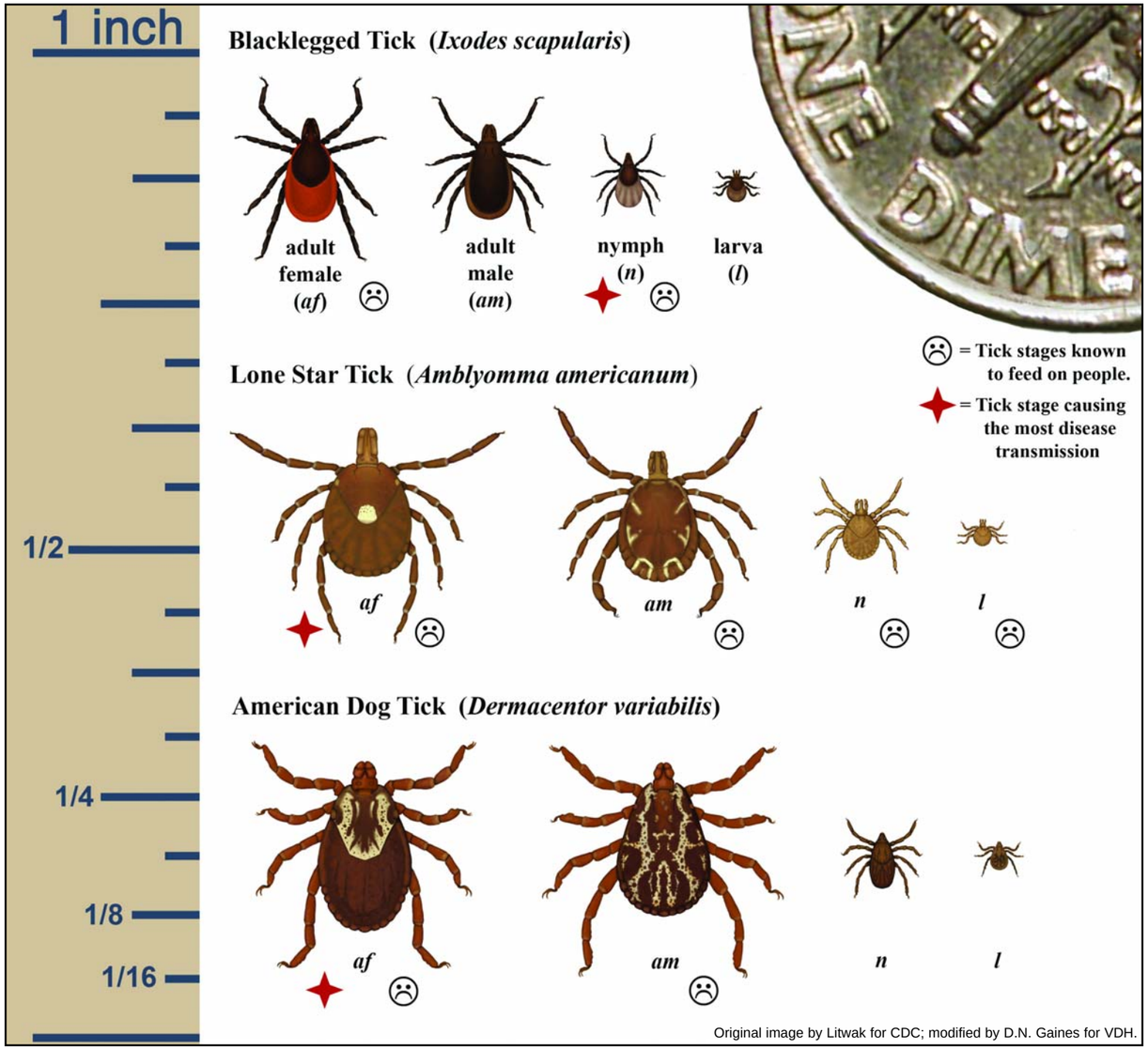
In Virginia, the American dog tick (*Dermacentor variabilis*) is the species known to carry the agent of Rocky Mountain spotted fever. The tick needs to feed on a host/person for only about four hours to transmit the bacteria. Fortunately, less than 1% of American dog ticks carry the agent of RMSF.

The Symptoms

Symptoms of Rocky Mountain spotted fever begin 2-14 days after the tick bite, and may include fever, deep muscle pain, severe headache, chills, and upset stomach or vomiting.

From the third to fifth day of illness a red, spotted rash may appear, beginning on the wrists and ankles. The rash spreads quickly to the

Tick Identification Chart



Original image by Litwak for CDC; modified by D.N. Gaines for VDH.

palms of the hands and soles of the feet and then to the rest of the body. However, only about half of RMSF patients develop a rash.

Spotted rash on arm and hand of RMSF patient.

The Treatment
Antibiotic treatment for RMSF is effective, and suspected RMSF should be treated as soon as possible based on symptoms and a history of tick exposure. The risk of death from RMSF increases by the fifth day of illness - but the rash often does not occur until that time. Therefore, do not wait for RMSF blood test results, or the appearance of a rash, before starting treatment. Treatment is important; almost one-third of those who do not get treated die from this disease.

Ehrlichiosis and Anaplasmosis

Although several diseases can be caused by bacteria in the *Ehrlichia* and *Anaplasma* genera, the most common in Virginia are human monocytic ehrlichiosis (HME) and human granulocytic anaplasmosis (HGA). HME is transmitted only by the lone star tick (*Amblyomma americanum*) and most commonly by bites from adult ticks. Lone star ticks are very common and are responsible for the most tick bites to people in Virginia. HGA is transmitted only by the blacklegged tick (most commonly by bites from nymphal stage ticks). The bacteria causing HME or HGA will not be transmitted unless the infected tick has been attached and feeding for at least 24 hours.

The Symptoms
Symptoms for both HME and HGA can include fever, headache, muscle pain, vomiting, and general discomfort. Illness can be severe - up to 3% of patients may die if not treated.

The Treatment
HME and HGA respond rapidly to treatment with antibiotics. Treatment should be based on symptoms (including platelet and liver enzyme tests) and history of tick exposure. Treatment should not be delayed while waiting for ehrlichiosis- or anaplasmosis-specific serology results.

Other Diseases
Ticks can transmit other diseases, such as tularemia (rabbit fever) and babesiosis. Neither of these illnesses is common in Virginia.

Tularemia is a bacterial disease that has a sudden onset of fever and chills. Typically, an ulcer develops at the site of the tick bite and surrounding lymph nodes become enlarged. Tularemia is a serious illness and untreated cases may be fatal. Tularemia is most commonly associated with the American dog tick, but may also be transmitted by the lone star tick.

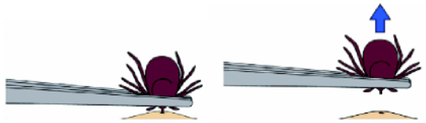
Babesiosis is caused by a parasite that infects red blood cells. The babesiosis agent is transmitted only by infected blacklegged ticks. Symptoms include fever, chills, muscle aches, fatigue, and jaundice. Fatalities may occur in immuno-compromised or splenectomized patients.

Prevention

Ticks do not jump or fly; they wait on the forest floor, leaf litter, or low vegetation and attach to the feet or shoes of people or legs of animals as they pass by. The ticks then crawl upward. The following steps can reduce your risk of tick-borne diseases:

- Avoid potential tick habitats such as tall grass and vegetation in shaded areas, forests, and along forest edges.
- Walk in the center of mowed trails to avoid brushing against vegetation.
- Keep grass cut and underbrush thinned in yards. If pesticides are used for tick control, follow directions carefully or hire a professional to apply the pesticide.
- Eliminate wood piles and objects that provide cover and nesting sites for small rodents around your property.
- Wear light-colored clothing so that ticks are easier to see and remove.
- Tuck pant legs into socks and boots, tuck shirts into pants, and wear long-sleeved shirts buttoned at the wrist.
- Conduct tick checks on yourself and your children every four to six hours while in tick habitat.
- Apply tick repellent to areas of the body and clothing that may come in contact with grass and brush. Repellents include those containing up to 50% DEET for adults or less than 30% for children. An aerosol repellent/insecticide containing 0.5% permethrin may be applied to shoes, socks, and other clothing, but should not be used on skin. Follow directions carefully and do not overuse. Some tick repellents can cause toxic or allergic reactions.
- Ask your veterinarian to recommend tick control methods for your pets. Animals can get Lyme disease, Rocky Mountain spotted fever, and ehrlichiosis, but they do not transmit these diseases to humans.

Tick Removal
Because ticks do not transmit disease until they have been attached to the host for several hours or several days, it is very important to remove ticks as soon as they are found. The following is the best way to remove a tick:



- Grasp the tick with tweezers as close to the skin as possible and gently, but firmly, pull it straight out. Avoid any twisting or jerking motion that may break off the mouth parts in the skin. Mouth parts left in the wound may cause irritation or infection similar to a reaction from a splinter.
- If tweezers are not available, be careful not to squeeze or rupture the tick's swollen abdomen while removing it. This may cause an infectious agent to contaminate the bite site and cause disease.
- After the tick has been removed, wash hands with soap and water. Apply a topical antiseptic to the bite site.
- You can dispose of the tick by drowning it in alcohol or flushing it down a drain or toilet. However, it may be useful to save the tick in alcohol for several weeks and have it identified by an expert in case you become ill. Knowing what kind of tick bit you might help your doctor diagnose the illness..
- Tick removal using nail polish, petroleum jelly, alcohol or a hot match is not safe. These methods could cause the tick to regurgitate an infectious agent into the site of the bite.

If you get sick, and you have been exposed to ticks, be sure to tell your doctor about your tick exposure.

For more information, visit our website at:
www.vdh.virginia.gov/epidemiology/DEE/Vectorborne/index.htm

VDH VIRGINIA DEPARTMENT OF HEALTH
Protecting You and Your Environment
www.vdh.virginia.gov

April 2010

PREVENTING TICK-BORNE DISEASES IN VIRGINIA