



Colorado Ticks and Tick-Borne Diseases

Fact Sheet No. 5.593

Insect Series | Trees and Shrubs

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Ticks are blood-feeding parasites of animals found throughout Colorado. They are particularly common at higher elevations. Problems related to blood loss do occur among wildlife and livestock, but they are rare. Presently 27 species of ticks are known to occur in Colorado and Table 1 lists the more common ones. Almost all human encounters with ticks in Colorado involve the Rocky Mountain wood tick. Fortunately, some of the most important tick species present elsewhere in the United States are either rare (lone star tick) or completely absent from the state (blacklegged tick).

Ticks most affect humans by their ability to transmit pathogens that produce several important diseases. Diseases spread by ticks in Colorado include Colorado tick fever, Rocky Mountain spotted fever, tularemia and relapsing fever.

Life Cycle of Ticks

Two families of ticks occur in Colorado, hard ticks (Ixodidae family) and soft ticks (Argasidae family). Hard ticks can be distinguished by the presence of a plate (scutellum) on the back behind the head. They also have mouthparts that are directed forward and are easily visible. The soft ticks lack the plate, have a less regularly rounded body and have mouthparts that are directed beneath the tick, so they are not visible from above.

Ticks go through four life stages as they develop. **Eggs** are laid in large masses that often total thousands of eggs. At hatch, there is a tiny **larva** (“seed tick”) that is six legged. After it has fed and developed it will molt to an eight-legged **nymph**. When this has fed and developed it will molt to the final stage **adult**. Both male and female ticks occur, with males usually smaller than females.

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Figure 1: Adult Rocky Mountain wood tick prior to feeding. Rocky Mountain wood tick is the most common tick that is found on humans and pets in Colorado.

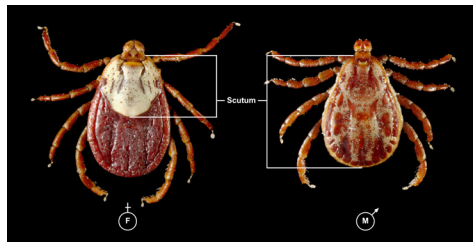


Figure 2: Adult female and male of the Rocky Mountain wood tick. Photograph courtesy of the CDC Photo Image Library.

The larva, nymph and adult ticks are active and feed on blood. When fully engorged with blood their body becomes greatly distended to the shape of a pea. With some species, the entire life cycle of a tick may be completed within a single year. The more commonly encountered ticks in Colorado usually require two or three years to complete development.

Hard Ticks. Most hard ticks are **three host ticks**. With this life cycle pattern each feeding stage occurs often on a different animal. For example, the larva of the **Rocky Mountain wood tick** (*Dermacentor andersoni*) feeds on small mammals, often a rodent. When it has completed feeding it drops from the animal, later molts to a nymph stage and the nymph seeks a new host. In the case of the Rocky Mountain wood tick, the nymph also feeds on small



Quick Facts

- The most common tick that bites humans and dogs in Colorado is the Rocky Mountain wood tick.
- Rocky Mountain wood tick is most active and does most biting in spring, becoming dormant with warm weather in summer.
- Colorado tick fever is by far the most common tick-transmitted disease of the region. Despite its name, Rocky Mountain spotted fever is quite rare here.
- Several repellents are recommended for ticks including DEET, picaridin, IR3535, and oil of lemon eucalyptus.
- To remove a tick, grasp it with tweezers, as close to the skin as possible and pull it straight out.

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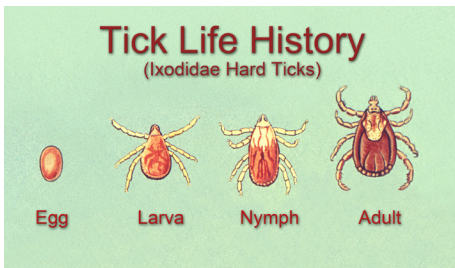


Figure 3: Life stages of a hard tick (Ixodidae). Image courtesy of the CDC Photo Image Library.



Figure 4: First stage larvae of the winter tick. Tick larvae are extremely small and have only 3 pairs of legs. Photograph courtesy of the Ken Gray Collection, Oregon State University.

mammals, including dogs, then drops to the ground later transforming to the adult. Adults of the Rocky Mountain tick feed on larger mammals such as deer, including humans. During each stage the tick may feed for days, sometimes weeks, before it becomes completely engorged blood. The **American dog tick** (*Dermacentor variabilis*), which is a common tick in the eastern plains areas of the state, has a similar life history.

When seeking a host, hard ticks will climb onto vegetation. There the tick will remain immobile until a passing mammal signals its presence through vibrations, the warmth of the animal, and the carbon dioxide it exhales. The tick will then actively extend its front legs (questing) to latch onto the animal as it brushes against it.

Hard ticks can be very resistant to starvation and nymphs and adults may survive a year without feeding. Survival is shorter under warm, dry conditions and many ticks will go dormant with high temperatures in late spring and summer. Most cases of ticks biting humans in Colorado occur in spring and end in summer.

Some hard ticks have slightly different life cycles. The **brown dog tick** (*Rhipicephalus sanguineus*) is also three-host tick, dropping from the host after each blood meal. However, brown dog tick

only develops only on dogs, reinfesting an animal at each stage in its development. Brown dog ticks are more abundant in warmer areas, and in Colorado are found where dogs are present continuously and are kept together in enclosed areas, such as kennels and homes. A different pattern occurs with the **winter tick** (*Dermacentor albipictus*), which is a **one host tick**, and the only one-host tick in Colorado. All feeding stages of winter tick remain on their host – large mammals such as elk, moose, or horses. The engorged adults drop from the animal sometime in spring and lay their eggs, which hatch in late summer and early autumn.

Soft Ticks. Soft ticks are more continuously associated with their host animal and feed more frequently than do hard ticks. Most, are usually live next to areas where their mammal host (often rodents) will nest or rest for long periods. Periodically the tick will move to feed on the host, usually at night, then return. Feeding times are brief and each stage (larva, nymph adult) will feed several times as they develop. This is the habit of *Ornithodoros hermsi*, the tick that is associated with tick-borne relapsing fever in Colorado.

The “**ear ticks**” (*Otobius* species) have a somewhat different habit. They develop as a one host tick and remain on the host animal continuously, dropping off only when the adult is ready to lay eggs. Two species of these ticks occur in Colorado, one that develops on rabbits and jackrabbits (*O. lagophilus*) the other (*O. megnini*) on various hooved mammals, particularly pronghorn.



Figure 5: Adult male of the Rocky Mountain wood tick questing on a plant stem. This is a position the ticks take when a potential host is detected. Photograph courtesy of the Ken Gray Collection, Oregon State University.



Figure 6: An adult female of the American dog tick before and after a blood meal. Photograph courtesy of David Shetlar, The Ohio State University.



Figure 8: Top and bottom view of a male brown dog tick. Photograph courtesy of Jim Kalisch, The University of Nebraska.

Tick-borne Diseases that Occur in Colorado

By far, the most common disease that is spread by ticks in Colorado is **Colorado tick fever**. This is caused by a virus and in most people produces symptoms similar to flu: headaches, fever/chills, and a feeling of fatigue. In about half the cases there will be a few days of symptoms, followed by recovery and then a second round of symptoms (biphasic fever). Normally recovery is complete, and symptoms disappear within a few days or weeks. In rare cases, serious complications can occur when the virus infects the central nervous system. The Rocky Mountain wood tick is the vector of Colorado tick fever and symptoms usually develop between three and seven days after the tick bite.

Rocky Mountain spotted fever (*Rickettsia rickettsii*) is caused by a type of bacterium. It can be a serious disease, potentially life threatening. Early symptoms include headaches and upset stomach, and a rash often develops a few days after fever symptoms. Rocky



Figure 8: Winter tick collected near Salida in March laying a mass of eggs.



Figure 9: A comparison between blacklegged tick (top), lone star tick (bottom left) and the American dog tick. The lone star tick and American dog tick occur rarely in Colorado, usually when carried on an animal. The blacklegged tick, the main vector of the organism producing Lyme disease, does not occur in Colorado. Photograph courtesy of Jim Kalisch, The University of Nebraska.

Mountain spotted fever can be successfully treated by physician prescribed antibiotics and if symptoms are suspected one should promptly seek medical attention. Despite the name of this disease, Rocky Mountain spotted fever cases are quite rare in Colorado, usually only a couple of cases/year at most (states that have much higher incidence of this disease are North Carolina, Oklahoma, Arkansas, Tennessee, and Missouri.) Rocky Mountain wood tick is the primary vector tick of this disease in Colorado, but the pathogen can also be transmitted by American dog tick and brown dog tick.

Tick-borne relapsing fever is also a disease produced by a bacterium (*Borrelia hermsii*). Symptoms include high fever, headache, and muscle/joint aches. These symptoms often follow a cyclical pattern, lasting about three days followed by a largely symptom-free period of 7 days, with symptoms then reoccurring. The vector of tick-borne relapsing fever is the soft tick *Ornithodoros hermsi*, which is associated with nesting rodents. Humans are usually bitten when sleeping in rustic cabins where

rodents are present behind walls, from which the ticks may emerge at night to feed. Cases of this disease in Colorado are rare, usually less than a couple per year, but can occur year-round.

Tularemia (*Francisella tularensis*) is also a bacterial disease. It can be widespread among many wild mammals, notably rabbits, prairie dogs, and muskrats. Cats can also become infected. Human cases most often result from contact with the blood of an infected animal but can also occur from bites of Rocky Mountain wood tick or American dog tick. In most years there are very few human cases of tularemia in Colorado, but in 2014-2016 there was a spike in incidence with 52 cases in 2015. Most cases of tularemia have occurred in Boulder and Larimer counties.

A rare but potentially serious condition from tick feeding is **tick paralysis**. This occurs when certain ticks (in Colorado the Rocky Mountain wood tick) remain attached for a long period and produce an ascending paralysis. Early symptoms, such as difficulty walking, progress to more generalized symptoms, such as limb numbness and difficulty breathing. This condition is completely reversible when the tick is removed. Tick paralysis can

also affect cattle, dogs and some other mammals.

Fortunately, the most important tick-borne disease in North America, **Lyme disease**, is not present in wild animal populations in Colorado (i.e., not endemic). **There has never been a confirmed case of Lyme disease originating from a tick-bite in Colorado.** There are a small number of cases of Coloradoans that have been diagnosed as having Lyme disease (seven recorded cases between 2007-2017) but all of these are thought to have originated from exposure to infected ticks in states where this disease is present.

The main reason that Lyme disease is not transmitted by ticks in Colorado is that the ticks capable of transmitting the pathogen (*Borrelia burgdorferi*) do not occur in the state. In eastern North America, Lyme disease is transmitted to humans primarily by the **blacklegged tick** or **deer tick** (*Ixodes scapularis*). In the Pacific states, ranging into Utah, the **western blacklegged tick** (*Ixodes pacificus*) occurs and can transmit the Lyme disease pathogen. In addition to Colorado, states that do not have either of these species include New Mexico, Wyoming, Montana, and Idaho.

Recommended Resources. Diagnosis of Lyme disease is notoriously difficult. Further complicating the situation is that there are several newly described diseases associated with ticks in North America. The best source for information on the present situation with tick-borne disease is always the [Centers for Disease Control](#). Also recommended is the website of the [American Lyme Disease Foundation](#).

Steps to Prevent Tick Bites

Avoid Tick Habitat

Ticks are most active in spring and early summer and concentrate where their animal hosts most commonly travel. This includes brushy areas along the edges of fields and woodlands or commonly traveled paths through grassy areas and shrublands. During tick season these sites should be avoided when possible and when walking on paths remain in the center to avoid brushing vegetation on which ticks perch.

Wear Protective Clothing

Long pants, long-sleeved shirts and other clothing can help exclude ticks or keep them from attaching to the skin. Ticks



Figure 10: An adult soft tick, laying a mass of eggs. Soft ticks may lay several masses of eggs. Photograph courtesy of the CDC Photo Image Library.



Figure 11: "Ear ticks" present in the ear of a rabbit. Photograph courtesy of David Shetlar, The Ohio State University.

Table 1: Common ticks found in Colorado.

Scientific name (common name)	Hosts
<i>Dermacentor albipictus</i> (winter tick)	Deer, elk and large domestic animals, especially horses.
<i>D. andersoni</i> (Rocky Mountain wood tick)	Small rodents, porcupines, deer, horses, cattle and other larger animals. Most common species that bites people.
<i>D. parumapertus</i>	Primarily cottontail rabbits and jackrabbits.
<i>D. variabilis</i> (American dog tick)	Small rodents, dogs, raccoons, and other animals. Occasionally feeds on people. Uncommon in Colorado and usually associated movements of pets infested in areas of the eastern U.S.
<i>Haemaphysalis leporispalustris</i> (rabbit tick)	Cottontail rabbits, jackrabbits.
<i>I. kingi</i>	Prairie dogs, mice, ground squirrels and other associated animals.
<i>I. sculptus</i>	Burrowing rodents, such as ground squirrels, and their predators.
<i>I. spinipalpis</i>	Cottontail rabbits, wood rats, and Peromyscus mice.
<i>I. texanus</i>	Weasels, skunks, and martens.
<i>Amblyomma americanum</i> (lone star tick)	Wide host range including livestock, many kinds of wildlife, and dogs. Will readily bite humans. A very rare species in the state that may occur in some sites in extreme eastern/southeastern Colorado.
<i>Rhipicephalus sanguineus</i> (brown dog tick)	Dogs. Infrequently feeds on people. Sometimes reproduces within the home.
<i>Ornithodoros hermsi</i>	Chipmunks, rock squirrels, other rodents.
<i>Otobius lagophilus</i>	Primarily cottontail rabbits and jackrabbits
<i>Otobious megnini</i> (ear tick)	Large ungulate mammals, particularly pronghorn

Table 2: Tick-borne diseases in Colorado.

Disease/causal organism	Incidence in Colorado	Symptoms	Tick vectors
Colorado tick fever/biphasic fever (a virus)	The most common disease transmitted by ticks. About 200 cases per year are reported, but it is suspected that this disease is largely under-reported.	Generally, flu-like, including aching, fever, chills and fatigue. This typically lasts for 1 to 3 days. Occasionally there will be a second cycle of symptoms following a short recovery. Recovery is normally complete, but in rare cases severe complications may develop.	Rocky Mountain wood tick, American dog tick
Lyme disease (a bacterium, <i>Borellia burgdorferi</i>)	There has never been a confirmed infection of a human that was traced to a tick bite in Colorado. A few cases have been reported from the state, but all are thought to have originated from exposure to infected ticks outside Colorado.	Often a characteristic ring-like reddish rash develops at the feeding site. Aching, headache and flu-like symptoms are typical early. Serious complications sometimes develop, including numbness and/or partial paralysis, severe headaches, fatigue, and effects on joints (arthritis), heart or nervous system.	Black-legged tick or deer tick (<i>Ixodes scapularis</i>). Ticks confirmed to transmit Lyme disease to humans do not occur in Colorado.
Relapsing fever/borreliosis (a bacterium, <i>Borrelia hermsii</i>)	Very rare.	Rapidly developing fever 3 to ten days after initial infection. Fever declines after about 4 days but may recur in multiple cycles.	This pathogen is transmitted by the soft tick <i>Ornithodoros hermsi</i> , which is associated with rodents (e.g., chipmunks, squirrels). Human infections typically occur when camping in rustic cabins inhabited by infected rodents.
Rocky Mountain spotted fever (a bacterium, <i>Rickettsia rickettsii</i>)	Rare, much more common in some areas along the Atlantic coast. About three cases per year, on average, are reported in Colorado. Historically, most cases have occurred in northwestern Colorado.	Initially, a general feeling of malaise and/or aches. A characteristic rash develops, starting on the wrists and ankles and later spreading to the rest of the body, including palms and the soles of feet. High fever is associated with infections.	Rocky Mountain wood tick, American dog tick
Tick paralysis (a reaction to tick saliva)	Rare. Occurs when certain ticks remain attached for a long period.	Early symptoms (e.g., difficulty walking) progress to more generalized symptoms (e.g., limb numbness, difficulty breathing). This condition is completely reversible when the tick is removed.	Rocky Mountain wood tick
Tularemia (a bacterium, <i>Francisella tularensis</i>)	Very rare in people but can be widespread in wild animals, particularly rabbits.	Sudden high fever, general weakness and swelling/pain of the lymph nodes.	Rocky Mountain wood tick, American dog tick. Most human infections occur from contact with the blood of infected animals (e.g., while skinning rabbits).

are usually acquired while brushing against low vegetation, so pulling socks over the bottom of the pants leg also is useful. Light-colored clothing can make it easier to find ticks that have been picked up.

Use Tick Repellents

There are a several repellents that are effective for ticks. Most commonly available is DEET but three other active ingredients are also recommended: **picaridan**, **IR3535**, and **oil of lemon eucalyptus**. These are applied either directly to the skin or to clothing. Repellents are most effective if applied to pants and other areas of the lower body likely to come into contact with ticks.

When applying repellents directly to the skin certain precautions should be considered:

1. On children, do not use high concentration formulations (e.g., DEET concentrations greater than 30 percent).
2. Apply the repellent to clothing, rather than to skin; this can be particularly effective for ticks that usually will climb on clothing.
3. Avoid applying repellents to hands or other areas that may come into contact with the mouth.
4. Do not apply repellents to wounds or irritated skin.
5. After use, wash or bathe treated areas, particularly on children.

Permethrin is an alternative treatment that is applied to the exterior of clothing. Clothing treated with permethrin can kill or repel ticks for days or even weeks, and often remains effective through a few washings. Permethrin should not be applied directly to the skin.

Conduct Tick Checks

Ticks take several hours to settle and begin feeding. This gives you ample time to detect and remove them. The Rocky Mountain wood tick typically takes 12 to 24 hours to start feeding. Therefore, a thorough “tick check” can be an effective alternative to repellents. After walking through areas where ticks might be present, carefully look for and remove any ticks you may have picked up.

How to Remove a Tick

Once a tick has become firmly attached to the skin, removal can be difficult and should be done with care. The mouthparts are barbed, so they may remain after removal and allow infection. Fortunately, the Rocky Mountain wood tick, the most common species found in Colorado, is relatively easy to remove because it has relatively short mouthparts. The recommended procedure for removal of ticks is:

1. Grasp the tick with fine tipped tweezers, as close to the skin as possible. If tweezers are not available and you must use your fingers, cover them with tissue or thin plastic to avoid the possible transmission of any disease organisms, such as tularemia, that the tick may harbor.
2. Pull the tick slowly and steadily, straight away from the skin. Try not to crush the tick as you remove it.
3. After the tick is removed, treat the feeding site with a disinfectant. Wash your hands when done. Never crush a tick with your fingers. Dispose of a live tick by putting it in alcohol, placing it in a sealed bag/container, wrapping it tightly in tape, or flushing it down the toilet.

Many other methods have been popularized to remove ticks, such as covering them with petroleum jelly or touching them with a hot match. These methods are not always effective at removing the tick and are also slow to work. The goal of tick removal is to have it done quickly, rather than to wait for the tick to detach on its own.

If you develop a rash or fever within several weeks of removing a tick, see your doctor. Be sure to tell the doctor about your recent tick bite, when the bite occurred, and where you most likely acquired the tick.