



Common Ticks of Oklahoma and Tick-Borne Diseases

Russell E. Wright
Professor Emeritus of Entomology

Robert W. Barker
Professor Emeritus of Entomology

Ticks are very important pests of wildlife, domestic animals, and humans. Their irritating bites cause extreme pain and economic losses in domestic animals and a great deal of discomfort to people who work or play in tick-infested areas. In addition, ticks transmit several disease-causing organisms in animals and humans.

Tick bites can cause dermatosis (an itching, swelling, inflamed condition of the skin) on the host. Tick bites can also lead to secondary bacterial infections. In animals, the loss of blood from tick feeding can cause secondary anemia and possible death.

Ticks have a very hard outer skin, which makes them quite tolerant of environmental stresses. The absence of tick predators and the wide host range of many tick species also increases their ability to survive. Some species have a life span of several years. These factors account for some of the tremendously large populations of ticks.

Ticks have four "developmental" or life cycle stages, known as the egg, larva, nymph, and adult (see Life Cycle Stages of Ticks). Larvae are sometimes called "seed ticks" and are about the size of a pin head. Nymphs are called "yearlings" and are somewhat larger. Adults and nymphs have four pairs of legs, while the larval form has six legs.

Ticks can be readily distinguished from insects in that their bodies are not divided into distinct segments. A distinct head is lacking, but the mouthparts form an apparent head of varying lengths, depending on the species.

The names "dog tick," "deer tick," and "wood tick" are commonly used to describe all ticks because of the association of ticks with dogs, deer, and woods. More specifically, however, these names are usually used in reference to the adult female hard tick when she has engorged (filled with blood), because she is much larger and thus more visible than during the other life cycle stages on hosts. The engorged female ticks may often be bluish-gray thus giving an entirely different appearance from other life stages. Adding to the confusion of names is the fact that some tick species have "dog" or "wood" in their common names, such as American dog tick, brown dog tick, and Rocky Mountain wood tick.

The life cycle and seasonal activity vary considerably for each species and will be discussed separately for each. Depending on the species, they are classified as a one-, two-, or three-host tick. As a one-host tick, the larva will attach itself

Oklahoma Cooperative Extension Fact Sheets
are also available on our website at:
<http://osufacts.okstate.edu>

to and remain on a single animal throughout its feeding stages (larva, nymph, adult). Each stage takes a blood meal. After the female has fed, she will drop from the host and lay her eggs on the ground in masses ranging from a few hundred to several thousand. The eggs hatch and the larvae crawl onto vegetation and transfer to a suitable host as it passes.

A two-host tick will undergo the feeding and molting process as the larva and nymph on one host. After the nymph feeds, it drops to the ground, molts, and the adult seeks the second host to complete the feeding cycle. Generally, the second host is larger than the first.

The three-host tick will feed on a different host for each of its three life stages. Usually the host becomes increasingly larger with each molt (e.g., larva on small rodents; nymph on rabbit to dog size animal; adults on large animals like cattle). After feeding on the third host, the female tick will drop to the ground, lay its eggs, and die.

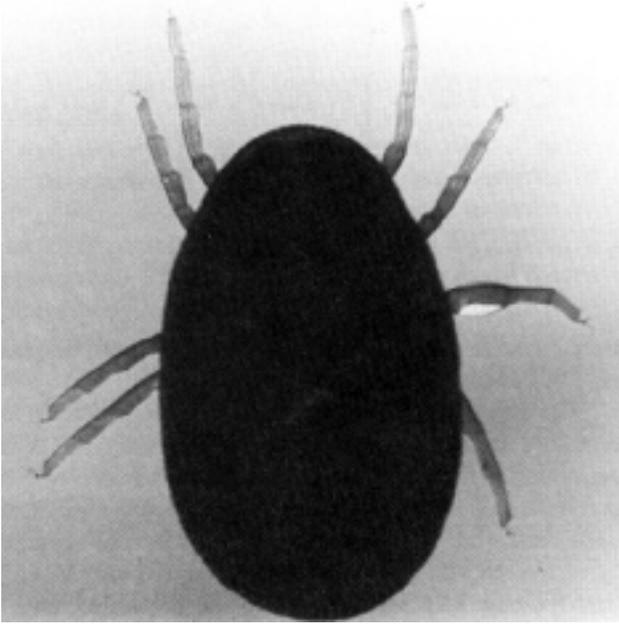
There are two categories of ticks: the Argasidae (soft ticks) and Ixodidae (hard ticks). The Argasidae are represented by two important species in Oklahoma that cause concern to livestock and poultry producers. The family Ixodidae is represented by a number of species, but only six of the more important species will be considered here.

Soft Ticks (Argasidae)

Fowl Tick [*Argus persicus* (Oken)]

The fowl tick, also known as the "blue bug" can be a very important poultry parasite. The larval, nymphal, and adult stages all feed on the same type of host. The adults feed primarily at night, leaving the host to hide in cracks and crevices or under debris during the day. Large populations of this tick are capable of killing birds or chickens by removing large amounts of blood during feeding. The fowl tick is also known to be a vector of fowl spirochetosis, a disease of chickens.

The female lays her eggs in cracks and crevices, and after they hatch, the young larvae feed on chickens. The larva may remain on the host four to five days before completing its feeding. After it leaves the host, it molts into the nymphal stage. The nymphs feed mostly during the night, and they



Fowl Tick

feed repeatedly and molt several times before reaching the adult stage. Under favorable conditions, the adult stage can be reached in about 45 days. This pest is capable of living for long periods of time without feeding.

Spinose Ear Tick [*Otobius megnini* (Duges)]

The spinose ear tick is a common pest of cattle, horses, and other domestic and wild hosts throughout Oklahoma. Humans have also been attacked. The tick is found in the ear canals of its host. The presence of large numbers can cause severe irritation, inflammation, and deafness of the animal. Secondary bacterial infections may cause sloughing of tissue in the ear canal. Infested cattle develop a “flop-eared” condition and show discomfort in movement of the head.

The immature stages, larva and nymph, are the parasitic stages, with the adult being non-parasitic. The larva and nymph are the only stages found in the ears. The nymph is easily recognizable by the spines on the integument and the peanut shape of the body. After the last feeding, the nymph leaves the host and molts to the adult stage. Males and females mate on the ground, and the female lays her eggs under feed bunks, boards, and other suitable protected areas. The newly hatched larvae crawl up feed bunks or other objects and await contact with a passing host.

Hard Ticks (Ixodidae)

Black-legged Tick [*Ixodes scapularis* (Say)]

The black-legged tick does not have colorful markings and is a three-host tick. It is an important pest of livestock and wildlife in the eastern half of Oklahoma. It is also known to inflict painful bites on man. It awaits its host along paths, trails, and roadways.



Spinose Ear Tick

The adults become active in late September and October and are present until March or April. During the early fall, it is often the most common tick on deer and cattle in Oklahoma. The larvae and nymphs are active in the spring and summer and feed on lizards and small mammals. This tick is considered a vector in the transmission of anaplasmosis to cattle. The nymphal stage is thought to be the main vector of Lyme disease.



Black-legged Tick

Winter Tick [*Dermacentor albipictus* (Packard)]

The winter tick is an important pest of horses, cattle, deer, and elk in Oklahoma. Coloration of the dorsal shield (scutum) varies from none to almost complete covering with white. It is the only one-host hard tick in Oklahoma, spending its entire life cycle on one host. This tick is believed to be important as a vector of anaplasmosis but seldom bites humans. Heavily-infested range animals may be killed due to blood loss if left untreated.

The larval stage becomes active in early October, and the nymphs and adults are most active during the late fall, winter, and early spring. Females lay eggs on the ground



Winter Tick

after feeding. The eggs may hatch in three to six weeks if temperatures remain above 50°F. The larvae bunch together and remain inactive until the onset of cool weather the next fall. This is a very large tick when engorged and is very noticeable on animals.

American Dog Tick [*Dermacentor variabilis* (Say)]

The American dog tick is a common pest of dogs and other small, wild or domestic animals, which are the preferred hosts for the adults of this species. This is a colorful species, having spots of light colors (white, gray, silver) scattered and superimposed over the basic brown or black body color. The American dog tick is a three-host tick. The adults sometimes attack large animals including horses and cattle but are seldom serious pests of these animals. The adults often attack

humans, and they are a serious pest in high-use, wooded recreational areas. The larvae and nymphs feed on small rodents (e.g., mice, rats, and rabbits).

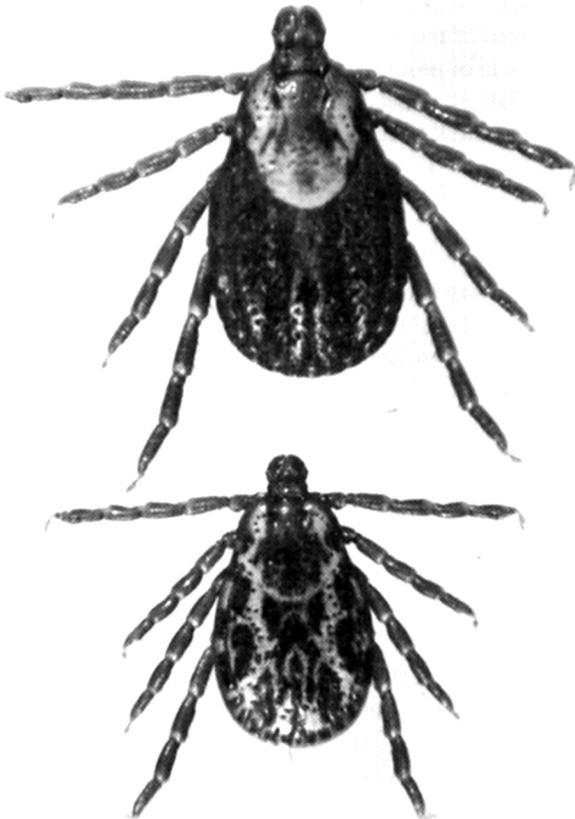
The American dog tick is the only proven vector of Rocky Mountain spotted fever in Oklahoma. It is also an important vector of Tularemia. Both of these diseases are important diseases of humans. This tick is also known to cause tick paralysis in people and dogs.

The larval and nymphal stages have been known to survive two years or longer without feeding. Under suitable conditions, the life cycle from egg to adult may require only three months, but usually the life cycle requires over one year.

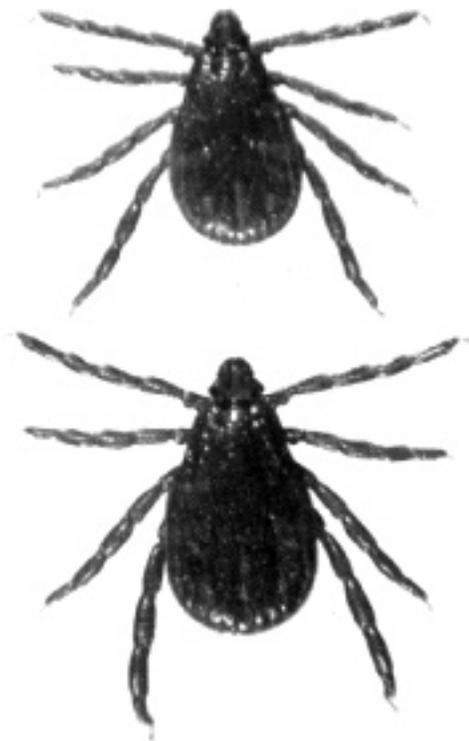
Brown Dog Tick [*Rhipicephalus sanguineus* (Latreille)]

The brown dog tick is probably the most widely distributed tick species in the world and is very common in Oklahoma. Dogs are the primary host, but when dogs and their bedding places are in close association with humans, the bites to people become more frequent. It is a three-host tick, but all stages feed on dogs.

The adult ticks are most often found in the ears and between the toes of dogs. The larvae and nymphs are found in the long hair on the back of the neck. The eggs are deposited in cracks and crevices of the dog kennel. These ticks have a tendency to crawl upward and are commonly found in cracks in the roof of dog kennels or ceilings of porches. These ticks will also become established in houses or other buildings that are being inhabited by dogs.



American Dog Tick



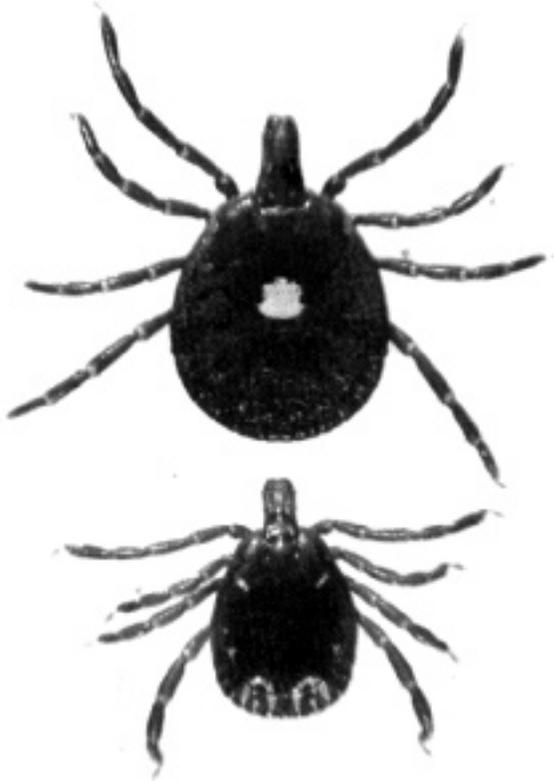
Brown Dog Tick

Lone Star Tick [*Amblyomma americanum* (L.)]

The lone star tick is a three-host tick and is an important pest of all livestock and wildlife. All life stages (i.e., larvae, nymphs, adults) of this species readily attack humans. This is probably the tick most commonly encountered by people during recreational activities in Oklahoma. Ticks will await a host along trails or pathways. The larval stage is known to attack some 40 different species of wild and domestic birds.

The tick receives its name from the lone spot on the dorsal shield of the female. The male has nonconnected white markings around its posterior margin. This species' mouthparts are much longer when compared with the other ticks discussed previously.

The lone star tick is active from early spring to late fall. The female is capable of laying 9,000-12,000 eggs. This species is also important from a public health standpoint. It is known to transmit Human Ehrlichiosis, Tularemia, and American Q fever.

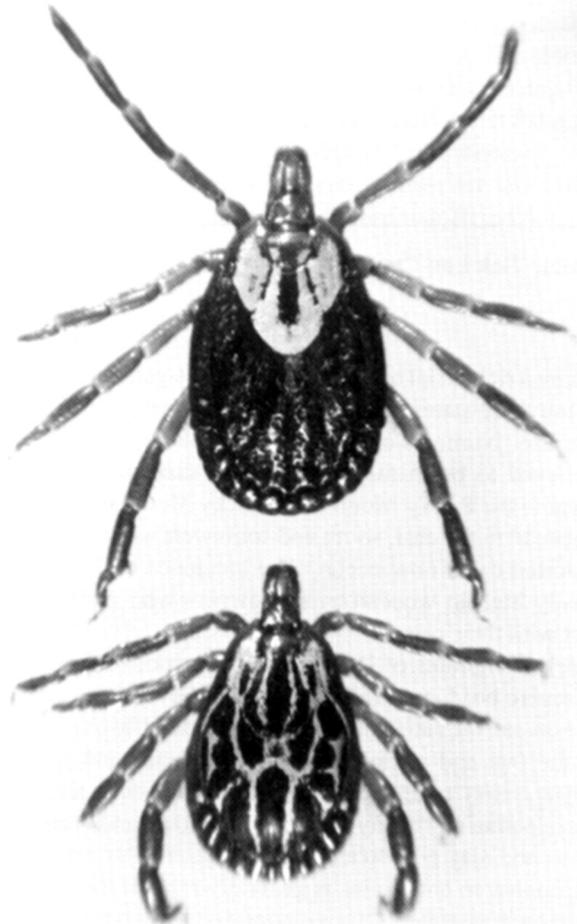


Lone Star Tick

Gulf Coast Tick [*Amblyomma maculatum* (Koch)]

This is a three-host tick. As larva and nymph, the Gulf Coast tick is a common pest of ground-inhabiting birds, such as meadowlarks and bobwhite quail, or small rodents. The adults primarily attack cattle, but a variety of other hosts including dog, horse, sheep, deer, coyote, and humans may be attacked. This tick has become increasingly abundant in the eastern half of Oklahoma and is an important pest of cattle. The adults attach to the ears of cattle and are most

abundant in early April to mid-June. When infestations are high on cattle, the ears may become thickened and curled, causing a condition called "gotch ear." This tick reportedly has produced tick paralysis in humans and dogs.



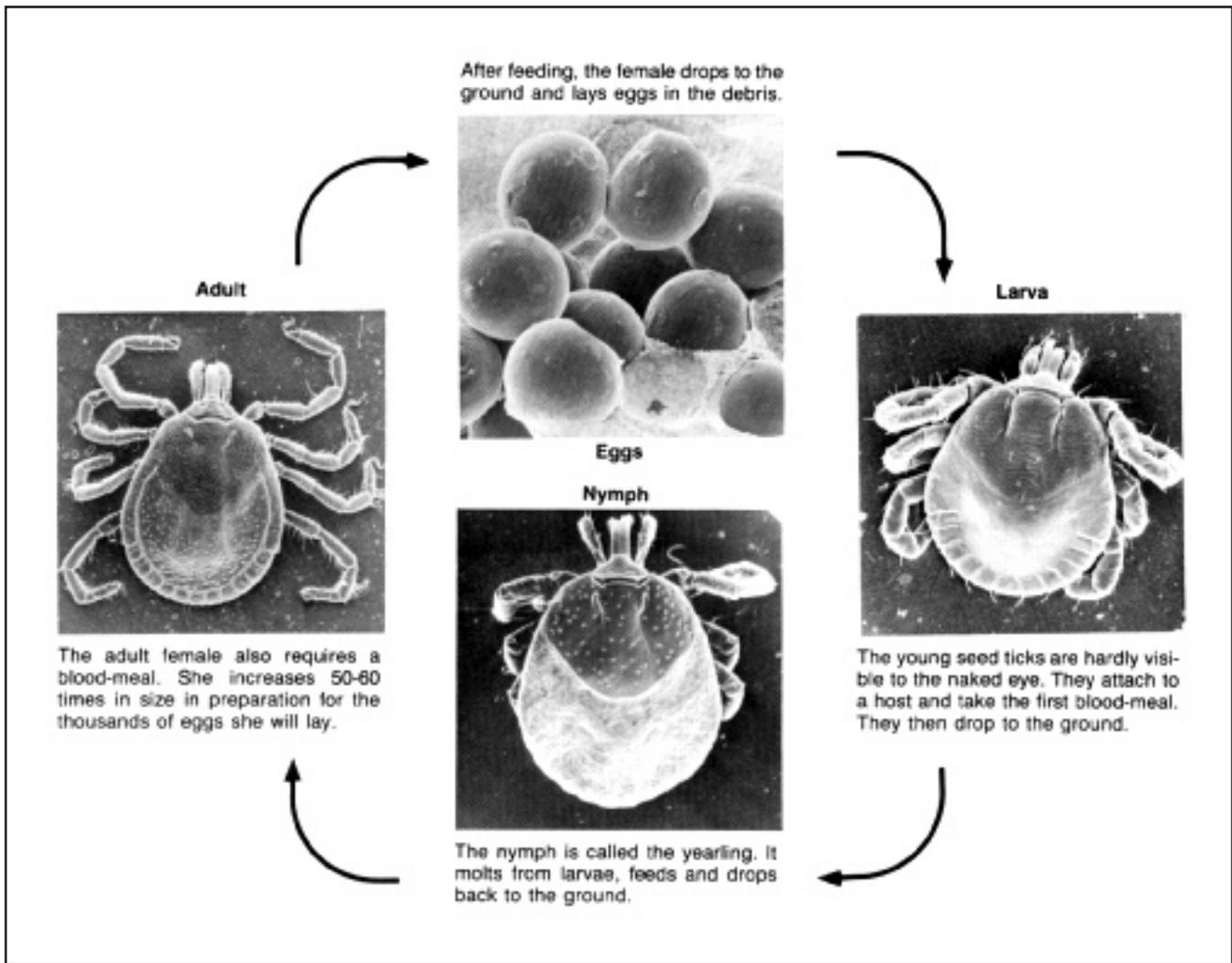
Gulf Coast Tick

Diseases Caused by Ticks

Rocky Mountain Spotted Fever

Rocky Mountain spotted fever (RMSF), also known as tick-borne typhus, is caused by a rickettsial organism, *Rickettsia rickettsia*, transmitted by the bite of certain ticks. It is the most important tick-borne disease in Oklahoma. Although it was first found in the Rocky Mountains, it is now mostly found in the Appalachian Mountains of the Tennessee Valley and the mountains and hill country of Arkansas, Missouri, and Oklahoma.

Every year Oklahoma ranks as one of the top three states in the number of diagnosed human cases of RMSF, with between 50 and 100 cases per year. Most of the cases of RMSF in Oklahoma occur between April and September, with the peak number of cases in May, June, and July. The American dog tick is the only tick that transmits RMSF, and it is most active in the spring and early summer. Most of the cases of RMSF occur in the eastern half of the state, where the American dog tick is the most abundant. Most people



Lone Star Tick Life Cycle

contact this tick in heavily wooded areas including many of the recreational areas of eastern Oklahoma.

Only a very small percentage of the ticks in most areas are infected and can transmit RMSF: probably less than 1 in 1,000 (0.1%). Ticks normally transmit the disease-causing organism only when they are attached and feeding. Most scientists believe that they can not transmit the disease until they have been attached and feeding for several hours: probably at least 24 hrs. Frequent inspection and removal of all ticks at least twice a day will prevent transmission from occurring. Always record the date of tick removal and save the tick for identification for 2 weeks; if no illness occurs, then discard the tick.

Symptoms of Rocky Mountain Spotted Fever

Usually the first symptoms of RMSF appear three to 14 days after the tick bite. They include sudden fever, chills, muscle aches, and headaches. Nervous symptoms such as sleeplessness, restlessness, and delirium may also occur. In about 50 percent of the patients, a characteristic spotty rash occurs on the feet and hands within two to three days of the fever. The rash may move to the rest of the body but does not start on the trunk of the body like the rashes caused by measles and some other diseases. If someone develops

these symptoms and knows they have been bitten by a tick, they should seek medical help immediately. When diagnosed early enough, RMSF can be effectively treated with antibiotics. Prompt treatment after the disease is diagnosed usually results in complete recovery, but if the disease is not treated, the mortality rate can be as high as 20 percent. There are currently no proven adequate vaccines for RMSF.

Lyme Disease

Lyme disease has become the most common and most rapidly spreading tick-borne disease in the northern and north-eastern United States since 1975. It is also one of the most highly publicized diseases by the news media and, because of its wide range of symptoms, has become mistakenly thought of as a common disease in Oklahoma. This disease is caused by a spirochetal bacterium named *Borrelia burgdorferi*. Despite the publicity and the great number of diagnosed cases in other parts of the U.S., Lyme disease does not seem to be very prevalent in Oklahoma. Since 1988, there has been a range of between 13 and 28 cases per year in the state. In the northeastern U.S., the main tick carrier of the disease appears to be the nymph of the black-legged tick. This tick is very abundant in Oklahoma and is considered to be the

most probable species involved in the transmission of the disease in the state. Larvae and nymphs normally feed on lizards (e.g., skinks) in Oklahoma, and they seldom feed on humans. This may be a reason there are relatively few cases of Lyme disease in Oklahoma.

Symptoms of Lyme Disease

The most characteristic symptom of Lyme disease is a rash that appears in 50 to 65 percent of the cases within three days to three weeks after the tick bite. In the beginning, the rash is red and about the size of a half dollar. The rash often expands in a ring or bull's-eye pattern, with the center area clear. This rash often seems to be associated with the site of the bite and is often called erythema chronicum migrans (ECM). The rash can be quite variable in appearance and does not necessarily appear the same on all people. Sometimes the rash appears as a number of blotchy red rashes on various parts of the body, and about 30 percent of the cases never develop a noticeable characteristic rash. Lyme disease is a flu-like illness with symptoms such as fever, chills, headache, stiff neck, and backache, and a very tired feeling usually occurs with the rash. Many people have no further symptoms and recover from the infection without treatment, but prompt treatment when these symptoms occur results in full recovery.

Some people who are not treated develop symptoms three weeks to months later, or even a year or two after the onset of the disease. These symptoms include arthritis-like pain in the joints, tendons, muscles, and bones that occurs from a week to months after the onset of the initial symptoms. Less common symptoms are numbness, tingling in the extremities, loss of concentration, sometimes a partial paralysis of the facial muscles, and in rare cases some heart arrhythmia and palpitations.

Lyme disease very rarely causes death, although it can cause a great deal of pain and discomfort and long-term disability if allowed to progress to the later stages. People who develop these symptoms after being bitten by a tick should see a doctor.

Tularemia

The causative agent of tularemia is the Gram-negative bacteria *Francisella tularensis*. Tularemia is sporadically distributed throughout most of the northern hemisphere. It is a disease of many wild animals, especially rodents and rabbits, and is transmitted in nature by various species of ticks. Tularemia has been known to occur in Oklahoma since the 1920s, with most cases from eastern Oklahoma. Over the past 10 years, an average of 25 cases per year of tularemia have been diagnosed from Oklahoma. Even though tularemia can be transmitted by handling infected animal carcasses (especially rabbits) and by ingestion of contaminated water, it is thought that most of the cases in Oklahoma are transmitted by the lone star tick.

Symptoms of Tularemia

The symptoms of tularemia include an influenza-like illness, having initial severe fever, temporary remission, and an additional fever period of two weeks. After the initial two weeks, there are often localized lesions, possible conjunctivitis, a reddening of the mucous membranes in the eye, and

enlarged, tender lymph nodes. Pulmonary complications are not uncommon and mimic community-acquired pneumonia.

Human Ehrlichiosis

Human ehrlichiosis is caused by a rickettsial organism *Ehrlichia chaffeensis*. The first human case was reported from Arkansas in 1986. Human cases have since been found in 12 southern states including Oklahoma, and it is thought to be a rare human disease. The suspected vector in Oklahoma is the lone star tick and possibly the brown dog tick.

Symptoms of Human Ehrlichiosis

Symptoms can be very mild to severe, requiring hospitalization, and include fever, chills, headache, aches and pains in the joints and muscles, loss of appetite, eye pain, nausea, and vomiting. There is usually no rash.

Tick Paralysis

Tick paralysis is not a disease but a condition caused when ticks inject saliva into the bite while feeding. Scientists are not sure whether the reaction is caused by a toxin injected with the saliva or if it is the result of a severe type of allergic reaction. This condition can occur in animals and humans wherever ticks are abundant, but it occurs very rarely. Several different tick species have been associated with tick paralysis, but in the eastern half of the United States, including Oklahoma, it has most often been caused by the American dog tick. The paralysis caused by the reaction to the toxin or other components of the saliva usually only occurs if the tick is attached to the back of the head, especially near the base of the skull or near the spinal cord on the neck or back.

Symptoms of Tick Paralysis

Symptoms usually occur three to six days after exposure to ticks and first appear as a paralysis of the hands and feet. As the tick continues to feed, paralysis moves to the arms and legs with loss of coordination, and then paralysis moves to the face and thoracic muscles, which leads to breathing difficulty and death. Although symptoms usually appear over eight days, complete paralysis and even death has occurred within 24 hours. Most severe cases usually occur in children, often in children with long hair where the feeding tick is not noticeable. Once a feeding tick is removed, the symptoms disappear in the reverse order of appearance and recovery is usually complete. When unknown paralysis occurs, one should always closely examine the patient for attached ticks.

Prevention of Tick-Borne Diseases

The best way to prevent tick-borne disease is to protect yourself and your family from tick bites. It is also important to remember that less than one percent of the ticks actually contain infected organisms. Ticks do not transmit disease while crawling on you. Do not panic if you find a tick attached. If a tick is attached, it should be removed following the directions presented in the methods of protection from ticks section. Keep close watch for any possible symptoms of the diseases caused by ticks, and if they occur, see a doctor immediately. All of the tick-borne diseases are usually easily cured with use of antibiotics, especially if treatment is started early.

Methods of protection from ticks

1. Avoid heavily-infested tick areas, especially in the spring and early summer.
 - Stay on cleared or prepared trails or paths.
 - Avoid tall grasses or bushy overgrown areas and areas covered with large amounts of leaf litter.
2. Wear protective clothing.
 - Wear light colored clothing so ticks can be seen easily and removed before they attach.
 - Wear long pants and tuck pant legs into boots or into high socks.
 - Wrap tape (masking tape works well) around the cuffs of your pants with the sticky side out. Ticks will be captured on the tape.
 - Wear boots or closed shoes.
3. Use a repellent that indicates it is good against ticks.
 - Many repellents contain DEET (N,N-diethyl-M-toluamide) which can be placed on the skin or on clothes. Higher concentrations, 20 to 40% or greater, of this repellent work best against ticks. DEET is sold under several different trade names.
 - Additional tick repellents contain the insecticide permethrin, which should be sprayed onto clothing where it remains effective for up to three washings. Do not apply to the skin. Read instructions carefully, as it is harmful to some fabrics.
4. Protect your pets and premises from ticks.
 - Inspect pets frequently for tick infestations. Remove ticks or treat for them.
- If your yard or premises is infested with ticks, treat it with the recommended insecticides. (See other OSU Extension Fact Sheets for tick control.)
5. Frequently inspect yourself and family members for the presence of ticks, especially children, at least every two or three hours if you are in a tick-infested area.
 - Examine the head and hairline especially close.
 - Crawling, unattached ticks cannot transmit disease and are easily removed.
6. Properly remove attached ticks.
 - Use tweezers to grasp the tick at the surface of the skin.
 - If you do not have tweezers, use tissues or a cloth to protect your fingers and to grasp the tick firmly. (Protection of your fingers is necessary because you could accidentally crush the tick. The body fluids could be infected and contaminate your fingers, and you could accidentally introduce the organism into mucous membranes or a scratch or wound.)
 - Pull the tick straight out with a slow steady pull.
 - Do not try to remove ticks with a match or other hot objects, as this may cause the tick to salivate and actually pump organisms into the bite.
7. To prevent tick populations from building up in your yard, keep ticks off your pets, keep your lawn mowed, and prevent the buildup of tall grass, weeds, or brush in fence lines or around shrubbery.
8. Do not use pet tick or flea collars on humans to repel ticks.

The Oklahoma Cooperative Extension Service

Bringing the University to You!

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

Oklahoma State University, in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, Title IX of the Education Amendments of 1972, Americans with Disabilities Act of 1990, and other federal laws and regulations, does not discriminate on the basis of race, color, national origin, gender, age, religion, disability, or status as a veteran in any of its policies, practices, or procedures. This includes but is not limited to admissions, employment, financial aid, and educational services.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Robert E. Whitson, Director of Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President, Dean, and Director of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of 42 cents per copy. 0406