Out for Blood!

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photos by Mike Blair

Villains of the outdoors, ticks must feed on blood to survive. But they're more than a nuisance when they transmit diseases to man and animals. Knowing how they live and feed can help avoid problems afield.

Nearly everyone recognizes a tick – even those who don't know a wasp from a bee or a beetle from a cockroach. There is something distinctive about a tick's melon-seed body, its sprawling legs, and, of course, the way it attaches and sucks blood. Many people think of ticks as the filthiest, most disgusting creatures on earth. A few years ago, I gave a lecture on ticks at a community meeting. A good friend and neighbor came up before I started and apologized for his wife's absence. He told me, "She said she already knew how disgusting ticks are, and she didn't want to know anything else about them." That represents a common view on the subject.

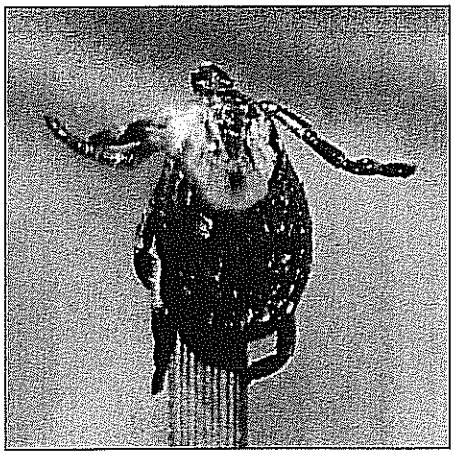
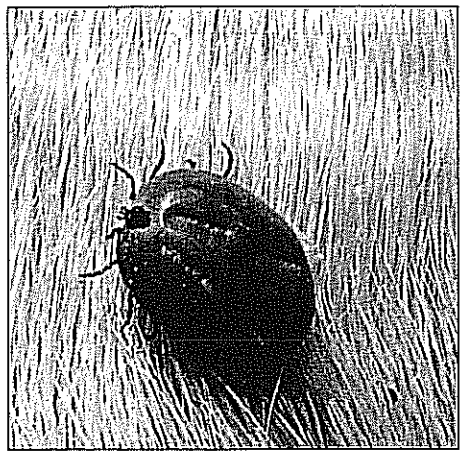
Let's try to subdue the nausea, though, and take a closer look at ticks encountered outdoors in Kansas. After all, they are a part of nature, and learning more about them may save your life. As nature's little blood-sucking syringes, it's not surprising that ticks are notorious transmitters of disease. Lyme disease gets most of the press, and there are several cases of it each year in Kansas. But there is also human concern with potentially deadly tick-borne diseases like Rocky Mountain spotted fever, tularemia, ehrlichiosis, and relapsing fever. Dogs may contract Lyme disease, tularemia, hepatozoonosis, and canine ehrlichiosis. House cats suffer 100 percent mortality from tick-borne cytauxzoonosis. Livestock productivity can be reduced by tick infestations or related diseases. Humans and animals alike can become paralyzed from toxins in tick saliva. Most tick bites don't cause disease, but leave welts that can itch for days or weeks. With all these considerations, it's wise to know something about such common outdoor parasites.

Male and female ticks often don't look alike, and immatures are different still. It might seem there are several thousand kinds, but only 20 tick species are documented in Kansas. Most familiar are the so-called "hard ticks" encountered in wooded, grassy, or other densely-vegetated areas. Other ticks resemble little gray beanbags and are called "soft ticks." Most of them are associated with nests of birds, rodents, or bats.

Most ticks require one to three years to reach adulthood, but they make up in prolificacy what they lack in speed of development. The number of eggs laid by a female varies among species and depends upon the size of the blood meal taken before detaching from the host. Typical egg numbers range from 3,000 to 11,000, produced in one mass beneath leaf litter or in a crevice.

The tick life cycle is fascinating in its complexity and length. After hatching, a hard tick feeds only three times – if it's lucky. The hatchling is scarcely larger than a speck of pepper, has only six legs, and, is referred to by entomologists as a larva and by laymen as a "seed tick." If it can find a host (usually a rodent or ground-inhabiting bird,) it feeds two to four days, detaches, molts, and becomes an eight-legged, pinhead-sized nymph. Nymphs feed four to six days on hosts ranging in size from mice to humans and then molt to adults. Here's the catch. Immature ticks must have a blood meal before each molt, and they must sometimes wait without feeding for months or years before finding a host opportunity. Some ticks never reach adulthood.

Those that do, mate and reproduce. In some species, mating occurs in the host animal's burrow

Twenty tick species are found in Kansas, including "hard" and "soft" ticks. Hard ticks are most familiar and include the lone star tick, named for the white spot on the female's back, above left. In Kansas, this tick is found mainly in eastern portions and is particularly hard on deer and other wildlife. Tiny juvenile lone star ticks are often mistaken for the deer tick, which is feared for its association with Lyme disease. Deer ticks are found only in a few counties of eastern Kansas, though ironically, most of the cases of human Lyme disease that show up in the state are contracted from lone star tick bites. The most abundant tick statewide is the American dog tick, center, sometimes called the wood tick. It attacks dogs, humans, and other large wild and domestic animals. This female is identified by the characteristic white shield just behind the head. Both lone star and dog ticks are most troublesome spring through early summer. The winter tick, right, is common on deer during winter months. This species stays on its host in all stages (except egg-laying,) rather than dropping to earth after feeding, as do lone star and dog ticks.

or den, but most Kansas ticks mate on the host as the adult female feeds. The female engorges for five to eight days, mates, detaches from the host, lays her egg mass within a few days, then dies.

Obviously, it is the feeding activity that affects man and animals. Immature ticks swell to several times their original size while feeding. Adult females become greatly swollen, sometimes attaining the appearance of a medium-sized, purple-gray grape. Males have little capacity, and one can scarcely distinguish an unfed male from one that is sated.

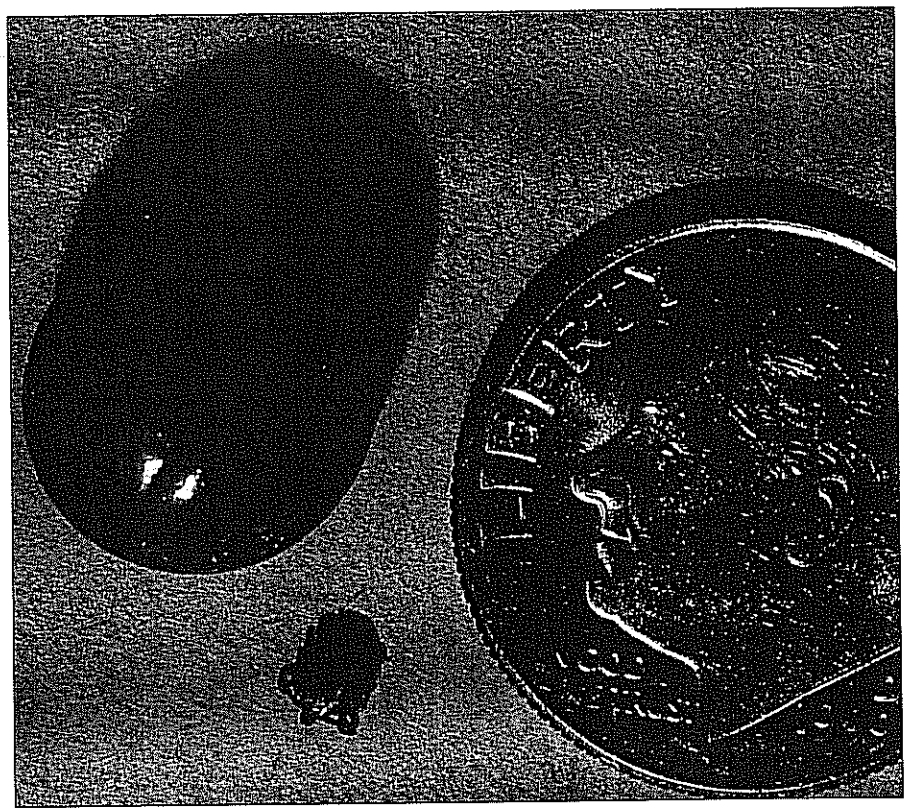
Various tick species use mammals, birds, and even reptiles as hosts. An animal quite commonly harbors two or three species of ticks at the same time. Although many kinds of ticks bite people, none depend on humans for survival. Some species are quite host-specific or accept only a few closely related species of hosts. Others, including virtually all that bite humans, can parasitize many different kinds of hosts.

There is much confusion in the common names of ticks. Entomologists sometimes use official common names that refer to animal hosts, such as the American dog tick and deer tick. However, since ticks seldom discriminate between hosts, a tick on a deer is not necessarily a true deer tick. Deer ticks can infest many species of birds and reptiles as well as mammals, and many other species of ticks infest deer. Non-scientists may be confused by the common names. The only way to precisely identify ticks is through their scientific names.

The most common statewide tick in Kansas is the American dog tick, *Dermacentor variabilis*. It has tolerance for a wide range of humidities, and this enables it to inhabit not only eastern Kansas forests and grasslands but also the brushy and grassy creek bottoms of western counties. Juvenile dog ticks (larvae and nymphs) feed exclusively on rodents. Adults are the common "wood ticks" or "dog ticks" that parasitize us, our hunting dogs, cats, cattle, horses, sheep, deer, coyotes, raccoons and just about any other mammal in the state. They are not found on birds. Adults are active from the first warm week of March until the heat of midsummer. Some may be encountered in August or later, but most are dormant at that time.

Another common Kansas tick found statewide is *Dermacentor albipictus*, the winter tick. It prefers hooved mammals and doesn't bite humans, but occasionally parasitizes dogs. This tick is unusual in that it stays on the same host through larval and nymphal stages, adulthood, and mating. In Kansas, it is not a summer parasite, but rather is active through fall and winter. Winter ticks are often found in abundance on deer killed by hunters in December. They are usually mistakenly called "deer ticks." This same tick species is often called "horse tick" by horse owners, "elk tick" by hunters in Wyoming and Colorado, and "moose tick" in Canada.

The lone star tick, *Amblyomma americanum*, is named for the single bright spot on the female's back. The species is present only in the eastern third of Kansas (except for recently discovered populations in creekside habitats in Clark and Meade counties.) Where it exists, it is often extremely abundant. Its impact as a nuisance and disease



The male American dog tick, above, is easily distinguished by the white stripes covering its back. Though the male is important for reproduction, it feeds little when compared to the egg-laying female. At right are fully-fed male and female dog ticks for comparison.

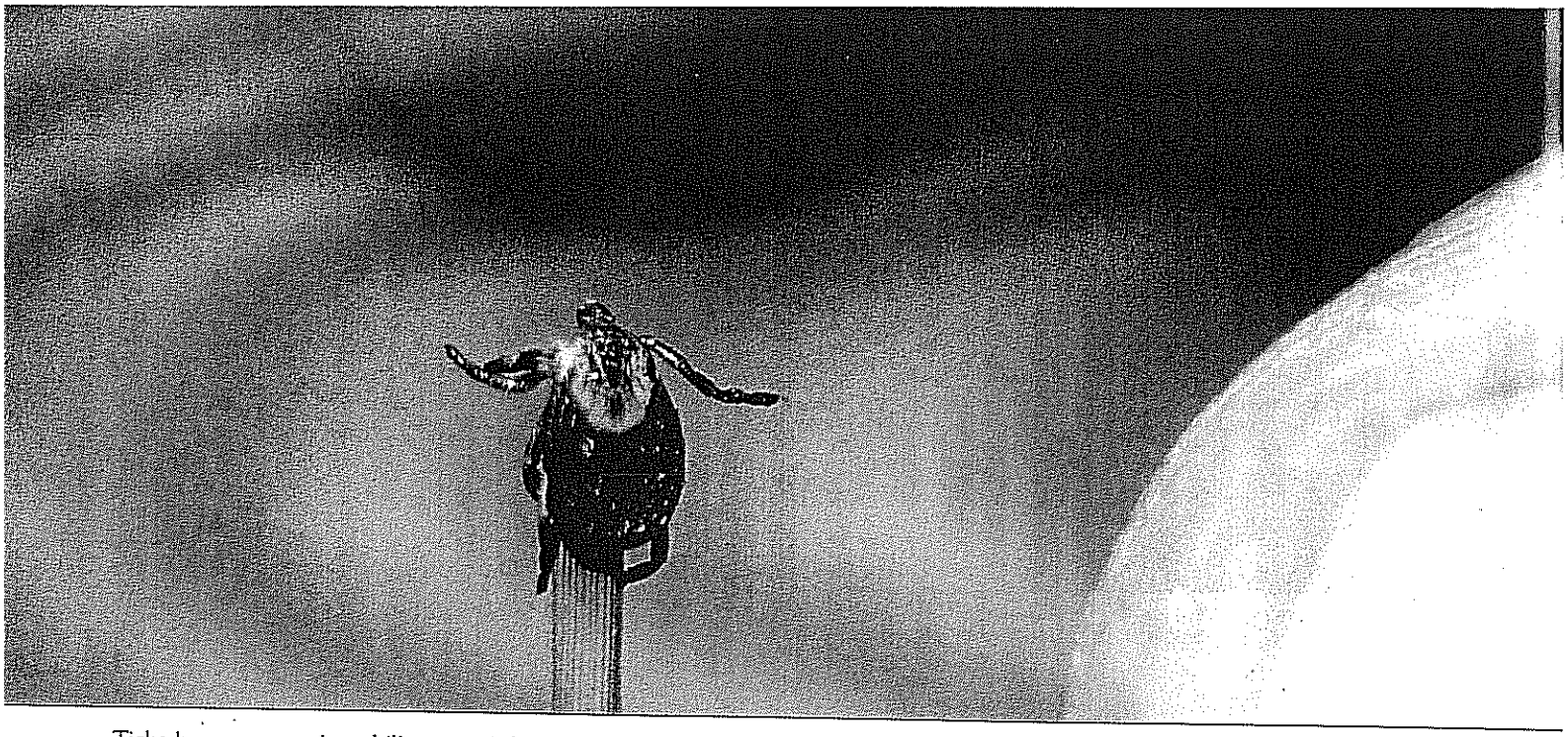
transmitter is magnified by the fact that larvae, nymphs, and adults feed on a wide choice of hosts. All stages infest anything from chipmunks to humans. Recent KDWP research in which I cooperated showed that nymphal lone star ticks are common to abundant on wild turkeys. Lone star tick nymphs and adults are active from March or April until frosty fall weather. Larvae are present from mid-July through early October. When people or domestic animals acquire pin-head-sized ticks in Kansas, the parasites are virtually always lone star tick nymphs. And the hundreds of "seed ticks" (larvae) that someone may find crawling up pantlegs are also of this species.

Lone star ticks can have a significant impact on local deer populations. One study in eastern Oklahoma found that these ticks parasitized white-tailed deer fawns so heavily, clustering around their eyes and ears, that up to 30 percent of fawns died annually of resulting complications. On adult deer, lone star ticks infest the ears and the area around the anus, but they may be found at nearly any anatomical site. In April, 1999, KDWP personnel sent me a sample of several dozen ticks from an adult deer in Crawford County that was burdened with thousands of ticks. All were lone star ticks. The deer died, apparently of blood loss, shock, and possibly the onset of tick paralysis, a condition resulting from toxins in tick saliva.

Tick paralysis is worthy of special note. Nearly any kind of tick can cause tick paralysis, but the *Dermacentor* ticks are notorious for it. The paralysis can affect humans as well as animals. Tick paralysis is usually associated with heavy tick burden, but even one tick attached for several days along the spine, especially at the base of the skull, can cause it. Paralysis starts from the toes and works upward, but unless the involuntary breathing muscles become too involved, the victim rapidly recovers upon removal of the tick that caused it. This is illustrated by the following event. A veterinarian received a German Shepherd that could drag itself around by its front legs but could not walk. Since the animal was loaded with ticks, the vet suspected tick paralysis and applied a tick-killing agent. Within a few hours, the dog was happily romping about the pen.

Other Kansas hard tick species worthy of mention include the Gulf Coast tick, the blacklegged tick, the rabbit tick, and the brown dog tick. These are less widespread and less commonly recognized throughout the state, though each may cause problems at times.

The only "soft tick" of importance in Kansas is the spinose ear tick, *Otobious megnini*. This species is common in Mexico and arid western states of the U.S. Although primarily a parasite of cattle, horses, and deer, it is not uncommon on dogs and cats. The tiny larva creeps deep into the host's ear canal, becomes a nymph, and feeds for months. The tick's body is covered with tiny spines, making removal quite difficult. Secondary infection and great discomfort are common. The host animal may paw at its ear, rub its ear against the ground, or hold its head at an odd angle. Occasionally, a doctor sends such a tick to me after having removed it from a human's ear. Easternmost



Ticks have an amazing ability to wait long periods between feedings, sometimes going months or even years without a blood meal. But this rarely happens, since most larvae and nymphs can feed on a variety of hosts ranging from birds and lizards to small and large mammals. To hitch a ride, they crawl to the tip of a leaf or twig and wait with outspread claws. Then, when an animal brushes past, they simply climb aboard.

Kansas records are from Harper and Russell counties.

The best way to reduce risk of contracting tick-borne disease is to avoid tick-infested habitat. However, that is often impossible. Whether hunting mushrooms or game, photographing wildlife, fishing, or going on a picnic, the very nature of such activities leads into prime tick habitat. Therefore, take advantage of ticks' habit of crawling upward on the host. Tuck pantlegs into stocking tops and shirt into pants. For extra protection, tape such clothing junctures with duct tape, then twist the tape so the sticky side is out and make one more wrap. Light-colored clothing makes it easier to see ticks crawling before they find skin.

You may want to use a repellent. Most repellents on the market contain deet. It's good for mosquitoes, chiggers, and gnats, but not much help against ticks. Look for a product with the word "tick" prominent in the product name. Then read the active ingredients to be sure it contains 0.5 percent permethrin. Such products are to be sprayed on items of clothing which are then allowed to dry before putting them on. The permethrin remains bonded with clothing fibers even through laundering and is an excellent tick repellent.

You can unwittingly share ticks with the rest of the family. When you get home from jaunts in the wild, leave your camping gear, hunting jacket, etc. outside until you can inspect them thoroughly and remove ticks from them. Once inside, remove your clothing and do a thorough whole-body inspection for ticks. Inspect your clothes, too, or launder them immediately.

Outdoor dogs need protection from ticks. Commercially available dog dips containing amitraz or permethrin provide protection for two to three weeks. Be sure to follow the label directions. Tick and flea collars are helpful but generally less effective than dips. [By the way, do not wear tick and flea collars around your legs. Your sweat will dissolve insecticide from the collar resulting in a much more concentrated pool of the material on the surface of the collar. You may incur toxic effects as well as chemical burns to your skin.]

The very best tick prevention for canines, however, is available only by veterinary prescription. In recent years a number of long-lasting systemic pharmaceuticals have been developed. Each treatment lasts for a month or more. Active ingredients in some such treatments

More About Tick-Borne Diseases

Most of us have removed plenty of ticks and never suffered ill effects, but we should not assume such good luck will last. All common Kansas tick species are capable of transmitting either Lyme disease, Rocky Mountain spotted fever, Tularemia, or ehrlichiosis. Human cases of all these occur every year in Kansas. Lyme disease may progress several weeks without signs of illness after the tick bite, and diagnosis can be difficult. Years of pain and physical and mental impairment may result. The other three diseases often show signs within two to five days of a tick bite. They may progress so rapidly that a day or two of delay in diagnosis and treatment may result in death. For up to three weeks after the bite, signs of severe or persistent headache, fever, soreness or stiffness in muscles and joints, appetite loss, "just feeling lousy," or a skin rash, should prompt an immediate trip to the doctor.

include selemectin, fipronil, and imidacloprid. Whatever treatment the dog is on, however, you should pat the dog down daily to be sure that no ticks survive.

Especially on humans, it's important to remove a tick as soon as it is discovered, since disease transmission increases with time of attachment. Be watchful and check yourself frequently for ticks. The less time they're on you, the less difficult they are to remove. Many people have sent me fully engorged ticks they had removed from themselves. Such ticks would have been attached from 3 to 8 days.

According to some, the best way to remove a tick is with a hot match (or lighter fluid, gasoline, fingernail polish remover, fingernail polish, or petroleum jelly). Such folk remedies are sustained by the fact that many ticks are removed while still in the process of attachment and can back out and try to escape unpleasant stimuli. Actually, these tactics can cause bodily injury and are often ineffective.

Instead, research trials have shown that the best method is to grasp the tick close to the skin with fine-tipped tweezers. Watchmaker's forceps are best. Place the tweezers close to and parallel to the skin so that you grasp the base of the tick's mouthparts rather than its body. Grasp it from "back to belly," not from side to side. Pull gently but firmly, straight away from the skin until the tick comes free. Then disinfect the bite site. Although many doctors have been taught to jerk the tick, or to use a "jerk with a twist," such methods virtually guarantee that mouthparts will remain imbedded in the skin and cause prolonged irritation. Several gadgets have been designed and marketed specifically for tick removal. A few of them may be effective, but none are superior to fine-tipped tweezers, and many of them are junk.

There are a number of myths about ticks that are simply false. For instance, ticks cannot jump onto you from trees. It does not help to pass through vegetation quickly to avoid ticks, since the tick's primary host-finding strategy is to wait at the tips of vegetation to catch a ride on passing victims. The more plants encountered, the more ticks encountered. For the same reason, staying on trails does not prevent ticks, unless the trails are well-maintained and have no adjacent plants to brush against. In fact, ticks gravitate to trails due to increased animal travel and the resultant scents along them. Ticks do not feed on plants while waiting for a host. They simply do not eat until a host is available.

Ticks may not be among Kansas' most loved fauna, but they do play an important role in outdoor checks and balances. Contact with humans and pets or livestock ranges from nuisance to life-threatening. If unusual symptoms should appear in conjunction with tick bites, or even weeks afterward, it's useful to tell a doctor who may then be alert to tick-borne disease possibilities. Dress wisely in tick country, use appropriate precautions, and thoroughly inspect yourself and your pets after each outing to remove unwanted hitchhikers.

Preventive measures are important to avoid problems with ticks. Shorts and loose-fitting clothes spell trouble when hiking or working in dense vegetation. Instead, wear long pants and socks, duct taping the junctures to prevent tick entry. Repellents are helpful, especially permethrin-based products that are sprayed on clothing. Pets and livestock should be protected with veterinary products to avoid the possibility of tick-borne diseases. Always check hair and body for crawling ticks after each outing. Fortunately, ticks are slow to fasten on, making it possible to remove them before they burrow into the bloodstream.

About the author: Ticks were Dr. Mock's primary focus for the last 13 years of his career as a specialist in veterinary and medical entomology at Kansas State University. Now, as Professor Emeritus, his insights into these important parasites are shared with our readers.