

She's been waiting three months for this moment. Days ago she crawled out of the grassy litter at the edge of the clear-cut and set out for the margin of a nearby deer trail. Perched atop a grass stem along that trail, with her hooked front legs raised to the sky, she has blindly waited day after day for the signs that drive her existence — a warming presence and a whiff of carbon dioxide — and here they are!

A large, warm form passes swiftly, giving her only one chance. She nabs the creature with her front legs and rapidly crawls upward, seeking a secluded spot

TICKED OFF

in which to settle down for the meal she's waited for so long. Upward and upward she journeys, until I feel her crawling on my neck, reach back and snatch her off my skin. I ascertain her species and then quickly dispatch her with a small rock.

No animal is more patient than a tick. An individual might perch, motionless, on a grass blade for days at a time in its questing posture (forelegs extended like grappling hooks), waiting for a host animal to walk by. It might

spend an entire summer waiting, and then, when cold weather arrives, retreat to the sanctuary of leaf litter to wait out the winter, only to emerge the following spring to wait again. A tick species found in

the western United States, the pajarello, may hold the world record among all animals for patience between meals; at least one individual lived for 17 years waiting for its next dinner of deer blood.

Is there anything in this world more despised than a tick? A silent, sneaking stalker, it crawls onto your person, slips unnoticed usually to an embarrassing location in the nether regions of your topography, and inserts its nasty little barbed mouthparts into your skin. Then, over the course of a few days to a week or so, it tanks up on *your* lifeblood. In the process, it may transmit to you some unpleasant baggage it picked up from its last meal, or perhaps from its mother. With such a nefarious lifestyle, do ticks have anything redeeming about them?

PATIENT, EFFICIENT AND OCCASIONALLY DEADLY, TICKS ARE COMMON PARASITES ALL ACROSS NORTH CAROLINA. THEY DO NOT, HOWEVER, HAVE TO RUIN YOUR TIME OUTDOORS.

WRITTEN BY CLYDE E. SORENSON
ILLUSTRATED BY JIM BROWN



An American dog tick waits patiently on vegetation for a host.

JIM OCCI, WWW.INSECTIMAGES.ORG

Frankly, I have a hard time finding anything positive to say about ticks and what they do to us and other animals, but one certainly has to admire how supremely well adapted they are to their way of life. Ticks are the quintessential parasites. A perfect parasite finds its host efficiently, gets what it needs quickly from that host and does little damage to the host in the process (there is little payoff in killing your host). This perfectly describes ticks, except that they sometimes “accidentally” transmit life-threatening diseases along the way.

Ticks are actually big mites, closely related to the chiggers that bedevil blackberry pickers, the spider mites infesting your sweet corn patch and the little follicle mites inhabiting the eyelashes and eyebrows of most people on the planet. There are about 800 or 900 species of ticks in the world, but only a handful of species are found in North Carolina. Like many other parasites, the majority of ticks are pretty tightly tied to just a few hosts. Since most ticks mate while on a host, specificity helps ensure that the sexes get together, and specificity also makes the nutritional quality of the resources the tick draws from its host more predictable. A few of our tick species specialize on birds or reptiles, but four regularly feed on mammals, including humans. Three of these can transmit disease to people.

AMERICAN DOG TICK



The American dog tick, *Dermacentor variabilis*, is the largest common tick in North Carolina. The adult females, unengorged, are about $\frac{3}{16}$ inch long, mottled in gray and brown; males are slightly smaller and also mottled. Engorged, females can exceed $\frac{1}{2}$ inch in length and resemble a gray wad of used chewing gum with tiny legs.

American dog ticks are three-host ticks. The six-legged larva hatches from the egg and seeks a deer mouse or vole. After a mouse blood meal, it molts into the eight-legged nymphal stage and sets its sights on a raccoon

or opossum. It then molts into the adult stage and waits for a dog or a human. Only the adult female typically bites people; males just board hosts to look for willing females and usually don't feed. Adult females can go more than 30 months without feeding. Once a female engorges and mates, she drops off the host, lays a mass of several hundred to thousands of eggs, and dies.

One morning in June 1986, I woke with a fever and a crushing headache — the worst I've ever experienced. I had been in the field just about every day for weeks, and several ticks had penetrated my hide. I was pretty sure I knew what was wrong. My fiancée took me to the university infirmary, where the staff drew blood samples and started me on antibiotics immediately. The headache and fever soon abated. Several days later my lab work came back positive for Rocky Mountain spotted fever.

Rocky Mountain spotted fever is caused by a bacterial organism called a rickettsia, transmitted in North Carolina primarily by the American dog tick. The disease was first described in the Rocky Mountains, but year in and year out, North Carolina leads the nation in reported cases. Most years between 100 and 300 people in the state contract it, making it our most common tick-borne illness. The symptoms of spotted fever include the headache and fever I experienced, but might also extend to vomiting, muscle aches and loss of appetite. These symptoms appear within two weeks of a bite by an infected tick. As the disease progresses, the rash it is named for appears in the form of abundant, tiny red spots, first on the wrists and ankles and then spreading up the extremities. Spotted fever is clearly the most dangerous of our tick-borne diseases. Left untreated, between 10 and 30 percent of those who contract it die.

Fortunately, as in my case, spotted fever is easily treated with antibiotics if the illness is caught soon enough.

Ticks in the larval or nymphal stage pick up the disease when they bite an infected animal, but infected females also can pass it to their eggs. Since these ticks are most active, and adults most abundant, in the summer, most cases occur between May and September. American dog ticks are most common in the Piedmont of North Carolina, and so is spotted fever; but one could contract it anywhere in the state.

American dog ticks also occasionally cause a somewhat mysterious illness known as tick paralysis, which, if untreated, can be lethal. Tick paralysis occurs when one suffers a tick bite at the base of the skull, in close proximity to the spinal cord. Apparently components of the tick's saliva interfere with the central nervous system. If the situation progresses far enough, breathing is compromised and the patient suffocates. If the tick is removed, the symptoms generally clear up very rapidly.

BLACK-LEGGED DEER TICK



The black-legged deer tick, *Ixodes scapularis*, is on the other end of the size spectrum, with unfed females averaging less than $\frac{1}{8}$ inch in length. These ticks are a reddish color with, as you might expect, black legs. Like American dog ticks, deer ticks are three-host ticks. The larvae typically feed on lizards, mice or small birds; the nymphs feed on rodents or birds; the adults feed on deer, dogs and people.

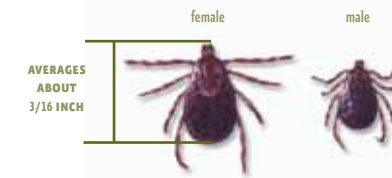
Deer ticks are much more likely to be active during the cool parts of the year than

Below: A black-legged deer tick creeps up a pair of jeans in search of a meal. Right: The same species engorged on blood.

LYNETTE SCHIMMING

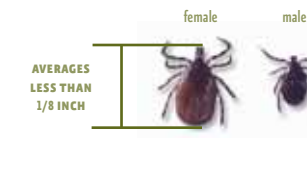


AMERICAN DOG TICK *Dermacentor variabilis*

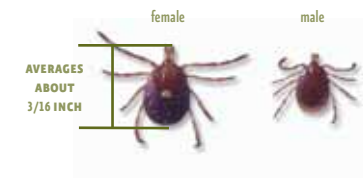


TICK PHOTOS BY ELIJAH MECK

BLACK-LEGGED DEER TICK *Ixodes scapularis*



LONE STAR TICK *Amblyomma americanum*



other ticks; I've picked them up in December and January on mild days. They are, of course, most common where deer and deer mice are abundant. Although they are not uncommon in North Carolina, most of the state's populations appear to be somewhat reluctant to bite people, unlike populations to the north of us.

Deer ticks are infamous as vectors of Lyme disease, a potentially serious infection caused by a bacterial spirochete. Lyme disease is named for the town of Olde Lyme, Conn., where it was first identified in the late 1970s. Lyme disease has become a problem in the northeastern states, around the Great Lakes and in northern California. Although it does occur in North Carolina, the habits of the tick and a generally low incidence of the spirochete in the tick population result in relatively few cases of the disease.

Lyme disease is characterized by fever, muscle aches and, in many sufferers, a “bull's-eye” rash — a bright red spot at the site of the bite surrounded by a ring of clear skin, which

is surrounded by a ring of reddened rash. Untreated, Lyme disease can cause arthritis, cardiac damage and neurological injuries that may take years to develop. Like Rocky Mountain spotted fever, though, it is easily treated with antibiotics if detected early.

LONE STAR TICK



After several hours of unsuccessful alligator nest searching, my partner and I staggered out of the swamp near Lake Ellis Simon in Craven County and piled into our work truck. Sweaty, scratched and reeking of swamp mud, we could think of nothing but a shower and a cold beverage. While my co-worker fired up the

truck, I slumped in the passenger seat and noticed a tiny brown fleck of “mud” crawling on the leg of my jeans. Then another and another and another followed.

Glancing over at my partner, I noticed a half dozen or more mud flecks wandering about on his shirt. We had apparently hit the mother lode of “seed ticks” — the larval and nymphal stages of the lone star tick, *Amblyomma americanum*. Back at the Forest Service depot, we resorted to duct tape wrapped around our hands, sticky side out, to help corral the teeming hordes of little blood-suckers. By the time we had “de-tickified” ourselves, we had removed more than 300 of the creatures. I had nightmares all that night about things crawling on me.

Lone star ticks are probably the most abundant ticks in the eastern half of North Carolina. Adult females are mahogany brown with a bright, creamy white spot in the middle of their backs — hence the name. Males lack the spot. Unlike the other species we've discussed, all stages of the lone star are quite eager to feed on humans. If you find tiny attached ticks, they are most likely larval or nymphal lone stars. The immature stages generally have a reddish-brown color. These ticks have proportionately large mouthparts and produce particularly itchy, painful bites. Many people (including yours truly) have a more severe allergic response to the bites of this species than the others.

For many years I was rather cavalier about lone star ticks. I regarded them as little more than an annoyance, since they didn't have a reputation for transmitting disease. However, scientists recently identified a form of Lyme disease, caused by a closely related organism, transmitted by lone stars in North Carolina. They also transmit ehrlichiosis, yet another suite of diseases caused by still other bacteria.

DEALING WITH TICKS

If you participate in virtually any outdoor pursuit in North Carolina, ticks are a fact of life. Although the proportion of individuals in any tick population actually carrying disease organisms is generally low, it is always prudent to regard any tick as a potential disease carrier. It's therefore a very good idea to do as much as possible to protect yourself from these nasty little creatures and the illnesses they carry.

First, recognize tick habitat. Ticks are most abundant in areas that provide good habitat for their normal hosts: rodents, wild carnivores and deer. For North Carolina species, that generally means edge habitat such as field margins, weedy transition areas between woods and pasture, the edges of swamp drainages and often the margins of our home lawns. Our pest ticks are also very susceptible

to desiccation, so they need to have good retreat cover handy—a place to hide from drying conditions. This often means leaf litter or dense, grassy vegetation.

Second, dress for ticks. Long sleeves and long pants are always a good idea in tick country. If possible, tuck your pants legs into your boot tops or socks. (Yes, it looks goofy, but it beats a course of antibiotics.) In really ticky areas, duct-taping your pants cuffs and shirt sleeves shut can help ward off the little beggars. If your outdoor activity of choice allows, light-colored clothing makes creeping ticks easier to see. When you return home, remove your clothes promptly and wash them.

Third, use repellents. The first and most effective of the two available is an aerosol clothing treatment containing the chemical permethrin. Permethrin is a synthetic version

of the naturally occurring insecticidal pyrethrins found in certain chrysanthemums. Although it is an insecticide, it is extremely offensive to tick sensibilities. I have spent odd moments in the turkey woods, when things are going real slow, watching a tick crawl across the treated knee of my hunting pants; the creature will walk on the very tips of its little legs, trying to stay as far from the chemical as possible. If it doesn't bail out quickly enough (or if I don't flick it into oblivion with a flip of my finger), it may eventually roll over on its back, fold up its legs and die.

Permethrin must be used only as a clothing treatment. If applied to skin, it is rapidly absorbed and deactivated, and it makes some people itch. Applied to clothing, however, it binds tightly to the cotton or woolen fibers, and its repellency may survive six or seven

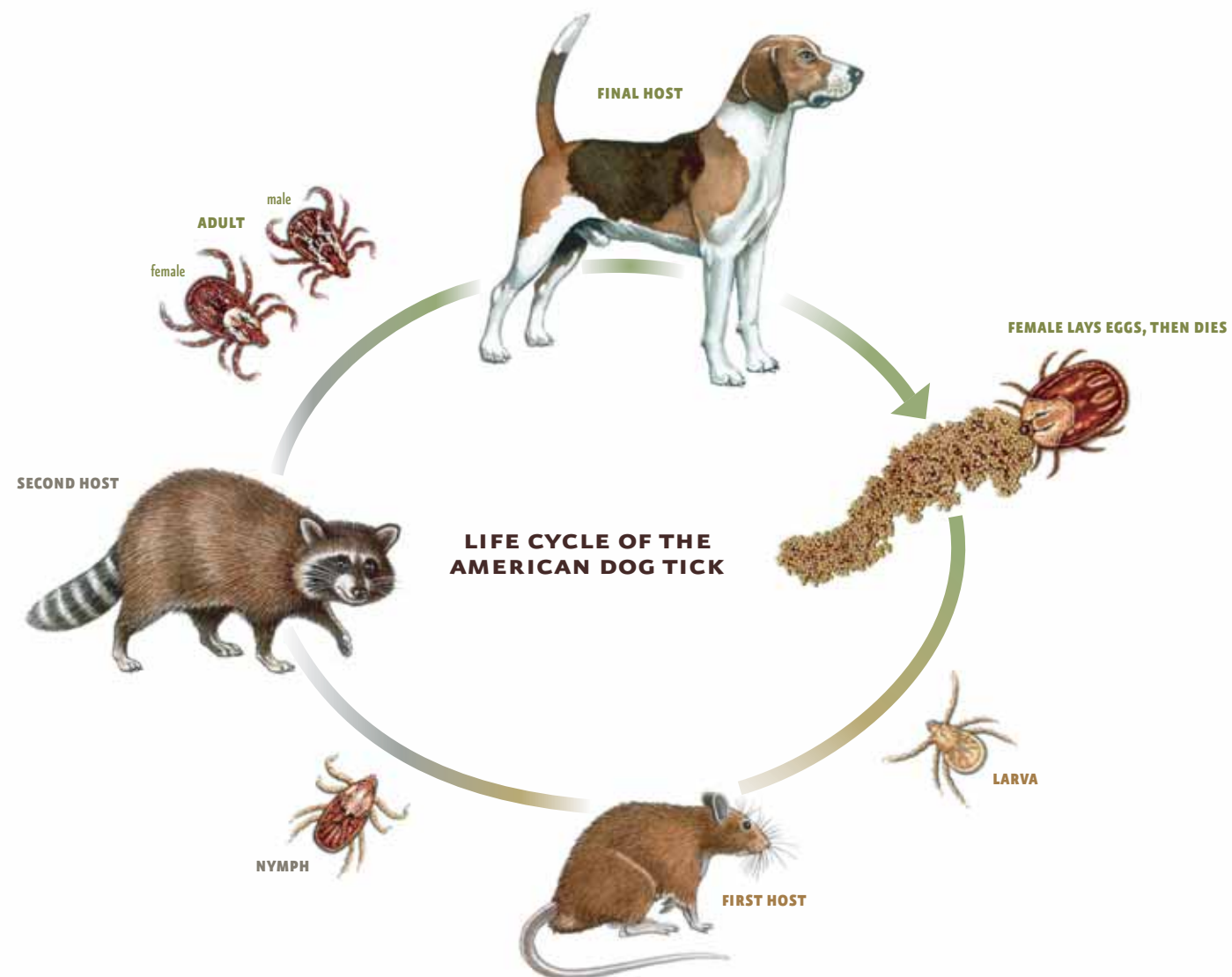
ALLEN C. STEERE



T. J. DUNN JR., THEPETCENTER.COM



Left: The telltale bull's-eye rash is characteristic of Lyme disease. Right: Engorged dog tick feeding on the host for which it is named.



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A close-up of the working end of a dog tick — its barbed mouthparts.

laundryings. Several permethrin products are available at outdoor stores or through Internet sporting goods vendors. If we had had permethrin treatment available to us in my old alligator project days, we likely would never have seen those hundred-tick days.

The second kind of repellent is applied to exposed skin. The most effective of those currently on the market contain DEET, the familiar mosquito repellent, and you use it just as you would to keep mosquitoes off.

Fourth, inspect yourself regularly for the sneaky little devils. It takes perhaps several hours for a tick to attach and to start feeding, so if you perform tick inspections every six to 12 hours, it is unlikely that any ticks that break your repellent barrier will have fed long enough to transmit disease agents. Ticks typically settle in places on your person where skin meets skin, where clothing fits tightly (such as at your belt) or at hairlines, so pay

particular attention to these regions. Don't forget to check your kids when they've been out, and don't ignore Fido, either.

In spite of everything you do, you may occasionally end up with an attached tick. As long as you remove the critter within five or six hours, there is little chance that it will have had enough time to transmit any pathogens to you, so there is no reason to panic. There is one right way to remove a tick and a host of wrong ways. Don't slather the tick in petroleum jelly, encase it in nail polish, touch a hot match to its rump or soak it in kerosene or any other flammable substance. These strategies will get you either a greasy, shiny, slightly baked and puking tick or a combustible but still-attached tick. Ticks have barbed mouthparts (vaguely like a frog gig), and they also secrete a cement when they attach that basically glues their mouthparts to the host. Trying to encourage them to back out is usually a fruitless enterprise.

The best way to remove one of the critters, therefore, is to gently but firmly grasp the head of the animal with tweezers as close to your skin as possible, and then apply steady, gentle pulling pressure until the mouthparts come out. Don't grasp the tick's body; you don't want to squeeze its gut contents into your skin. In a pinch (pardon me) you can use your fingernails for this exercise, but be mindful that you may contaminate them with tick gut contents. If you can, use a piece of tissue to insulate your fingers from the offender. Should the tick's mouthparts

break off during this process, use a knife blade to scrape out the remains. Although you aren't likely to contract disease from a piece left in, the area might get infected. Wash the bite site and your hands when you get done.

Once you remove the tick, it is an excellent idea to save it in a small bottle of alcohol for at least two weeks. Symptoms of most tick-borne diseases will begin showing within those two weeks. If you do become sick with suspicious symptoms, take the preserved tick with you to the doctor, who can use the identity of the tick to help determine the probable cause of your illness.

Finally, use care when pulling ticks off your pets; you can contract disease from the ticks should you get their stomach contents or secretions in cuts on your hands or inadvertently rub them in your eyes. Latex gloves are good for this chore. Bear in mind, too, that your pets can contract disease from ticks. Keep your pets dosed with a good flea and tick repellent, particularly during the warm months.

Ticks are unloved by practically everyone, and that's not likely to change. But if you understand them and take precautions against them, there is no reason they should keep you from enjoying the outdoors. ⇐

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