

# What's Eating You? *Dermacentor* Ticks

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## Taxonomy

*Dermacentor* ticks belong to the family Ixodidae (hard ticks). The best known members of the genus are *Dermacentor andersoni* (Rocky Mountain wood tick [Figure 1]) and *Dermacentor variabilis* (American dog tick [Figure 2]). *Dermacentor* ticks are large (approximately 6 mm) and are flattened dorsoventrally in the unfed state. They have small anterior mouthparts attached to a rectangular basis capituli. In the adult stage they exhibit a sclerotized dorsal plate, or scutum, that is decorated with colorful patterns and deep punctations. The female tick has a scutum that covers one-third of the dorsal surface (Figure 3) and allows for engorgement during feeding.<sup>1</sup> Notably, these ticks have wide-spaced eyes and posterior festoons. The brown legs of *D andersoni* have a pair of medially directed spurs on bifid coxa I and an enlarged coxa IV. *Dermacentor variabilis* has 2 large spurs on coxa I whereas the 3 remaining coxa have smaller spurs. These ticks can be found in heavily wooded areas but more commonly inhabit abandoned fields and open areas of low bushy grasses and shrubs.<sup>2</sup> While *D andersoni* is most abundant in April and May, *D variabilis* is active in mid-April and peaks in June.<sup>3</sup>

*Dermacentor* ticks tend to attach to the head and neck region where they are commonly hidden by hair. In contrast, *Amblyomma americanum* ticks attach to the lower legs, buttocks, and groin, and *Ixodes scapularis* ticks show less site preference but often attach to the trunk. The saliva of *D andersoni* suppresses host cell-mediated immunity by inhibiting

T-cell and B-cell responsiveness as well as cytokine production from macrophages,<sup>4</sup> which may represent an adaptive response to protect the tick and allow it to feed.

## Distribution

*Dermacentor variabilis* is found in most parts of the United States, except the Rocky Mountain states. In parts of Canada, its range overlaps with *D andersoni*. Both species carry Rocky Mountain spotted fever, though *D variabilis* is the major vector. *Dermacentor variabilis* is the predominant vector of Rocky Mountain spotted fever in the eastern and south central United States, while *D andersoni* transmits the disease west of the Mississippi River in the Rocky Mountain states. The highest incidence of Rocky Mountain spotted fever is in North Carolina.

## Rocky Mountain Spotted Fever

In an endemic area, Rocky Mountain spotted fever should be suspected in any patient with fever and a headache. Symptoms overlap with other diseases, namely Colorado tick fever, and may compel the clinician to pursue further investigation, but empiric antibiotic therapy should never be delayed while waiting for the results of diagnostic tests. Indirect fluorescent antibody testing is most widely used and has an overall sensitivity of 95%. It should be noted that false-negative results are most frequently encountered during the first 5 days of symptoms or in patients who are treated within the first 48 hours after the onset of symptoms.<sup>5,6</sup> *Dermacentor* ticks can be vectors for Colorado tick fever, Q fever, tularemia, *Rickettsia peacockii*, and human monocytic ehrlichiosis, though *A americanum* appears to be the major vector for the last of these conditions. Tick paralysis occurs when a female tick releases neurotoxins that slow motor nerve conduction velocity, lower the action potential height of nerve and muscle, and impair afferent nerve fiber signal propagation.<sup>7,8</sup> While fever is absent, a rapid, progressive, ascending paralysis occurs 5 to 6 days after

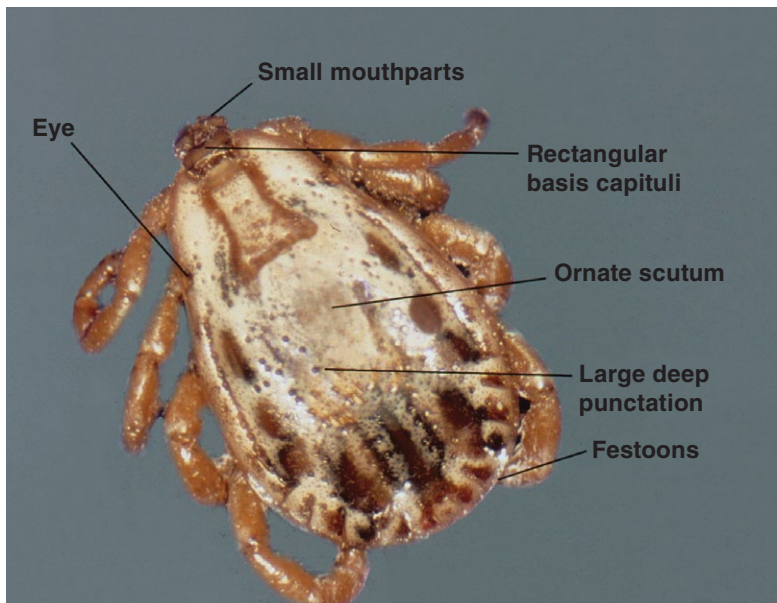
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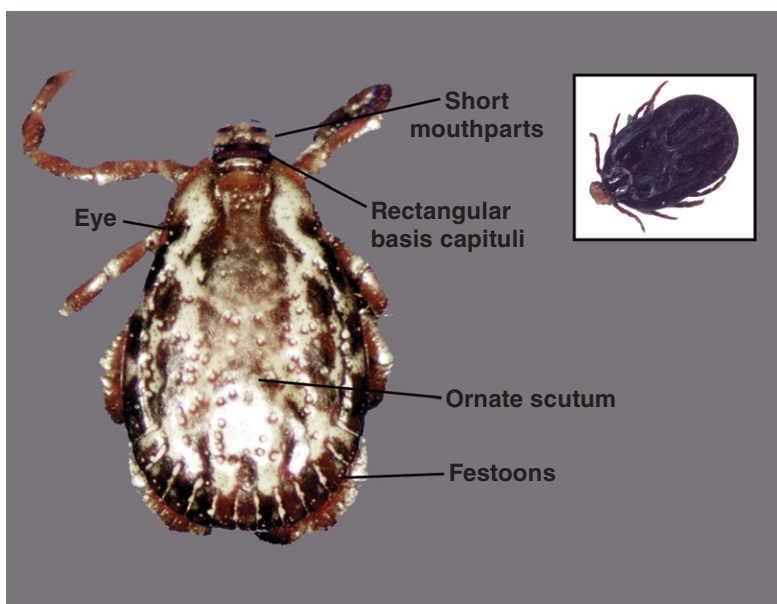
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**Figure 1.** *Dermacentor andersoni* is characterized by wide-spaced eyes, festoons, and an ornate scutum.



**Figure 2.** *Dermacentor variabilis* is characterized by wide-spaced eyes, festoons, and an ornate scutum that is often more silver in color. It is common in the mid-Atlantic states.

the tick attaches. Immediate improvement occurs after removal of the tick, but it is often hidden by scalp hair. Tick paralysis carries a fatality rate of 6% to 12%.<sup>9,10</sup> In most fatal cases, this diagnosis is not considered antemortem and the tick is subsequently found on autopsy.

### Management and Treatment

In patients with Rocky Mountain spotted fever, treatment initiated within 5 days after the onset of symptoms results in a substantially lower mortality rate than patients treated after 5 days.<sup>11</sup> Doxycycline is the treatment of choice in adults and children,

while chloramphenicol is used in pregnant women.<sup>12</sup> Treatment should continue for at least 3 days after defervescence. While some physicians advocate prophylactic therapy,<sup>13</sup> most do not recommend prophylactic therapy because less than 1% of ticks carry *Rickettsia rickettsii*.<sup>14,15</sup> Therapy is highly effective if started at the first signs of fever or headache. Other arguments against prophylaxis include cost-effectiveness and the inability to time single-dose prophylaxis appropriately, as the incubation period is variable.<sup>16</sup> A dose of tetracycline given too early in the course of incubation will not prevent disease but only delay the onset of symptoms.



**Figure 3.** Female *Dermacentor* ticks have a small scutum to allow engorgement of the abdomen.

Protection against tick bites includes avoidance of infested areas; removal of leaf debris; area sprays of insecticides; use of repellents; treatment of clothing with permethrin; and treatment of pets with oral, injectable, or topical agents prescribed by a veterinarian.

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