

The Western Black-legged Tick and Lyme Disease

By Rebecca Eisen and Lars Eisen

Most people probably associate Lyme disease with the northeastern United States. From 1992 to 1998, more than 44,000 cases were reported from New York and Connecticut alone. During the same period, California reported only 867 Lyme disease cases. However, unfortunate for us, most Californian cases occur in Mendocino, Humboldt, and Trinity counties (see Fritz and Vugia, 2001; *The Infectious Disease Review* 3, 111-122)

Lyme disease is caused by a spiral-shaped bacterium called *Borrelia burgdorferi*. In California, it is transmitted to humans and domestic animals by the Western Black-legged Tick, *Ixodes pacificus*. We do have other human-biting ticks in California (such as the dog tick, *Dermacentor variabilis*, and the Pacific Coast Tick, *Dermacentor occidentalis*) but they cannot transmit the Lyme disease bacterium. The Western Black-legged tick has 3 active life stages; larva, nymph and adult. All stages need a single blood meal to be able to develop to the next stage (larvae and nymphs) or lay eggs (females). Larvae and nymphs usually feed on small vertebrates such as lizards, rodents, or birds, but the female ticks need so much blood that they must feed on larger animals, like jackrabbits or deer. Female ticks feed once, lay up to 1,000 eggs and then die. Because the tick stays inactive during the warm, dry summer and fall months, it usually takes 3 years for a tick to complete its life cycle. One study in the Potter Valley area (see Cover and Lane 1995; *American Journal of Tropical Medicine and Hygiene* 53, 237-240) indicated that most Lyme disease cases were associated with bites of the nymphal tick stage but that female ticks also contributed to the transmission of Lyme disease bacteria. Ticks generally need to be attached for 24-48 before transmitting Lyme disease bacteria. The smaller nymphs tend to cause less of an immune response than the female ticks and probably are able to feed for a longer time before being detected. In fact, people with Lyme disease are often unaware of being bitten by a tick.

Nymphs can be active from late February to early October in Mendocino County, but peak activity usually occurs from mid-April to mid-May. People are at risk for nymphal bites in leaf or fir needle litter areas. Nymphs are also present in grassland but since they do not climb vegetation there is little risk of human exposure. Nymphs are generally more abundant in oak or madrone woodland than in redwood areas. The Lyme disease bacterium appears to be present wherever the Western Black-legged Tick is found, usually with 2-15% of nymphs infected.

Adult ticks are active from late Fall to early Spring, but are most abundant in the winter. Host-seeking adults are found in grasslands and chaparral areas, but rarely in leaf litter. On average, only 1 to 2% of adults are infected with the Lyme disease bacterium. The decreased rate of infection from nymphs to adults is probably because nymphs feed abundantly on Western Fence Lizards, which can eliminate Lyme disease bacteria from feeding ticks.

Rebecca and Lars Eisen were post-doctoral fellows with Prof. Robert S Lane, Dept. of Environmental Science, Policy and Management, University of California at Berkeley. For additional information, see "Lyme Disease in California" by Robert S. Lane, <http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7485.html>.