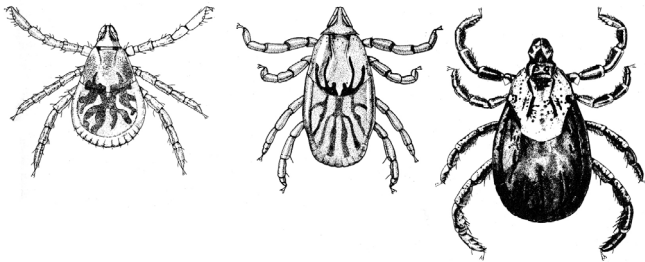




Ticks



American Dog Tick, *Demacentor variabilis*. Larva (left), nymph (middle), unengorged adult female (right)

Ticks are blood-feeding external parasites of mammals, birds, and reptiles throughout the world. They are not insects, rather they are arachnids, the same class of organisms as spiders and scorpions. There are two well-established families of ticks, the Ixodidae (hard ticks), and Argasidae (soft ticks). Both are important vectors of disease to humans and animals throughout the world. Some diseases of current interest in the United States caused by tick-borne pathogens include Lyme Disease, Rocky Mountain Spotted Fever, and tick-borne Relapsing Fever.

Hard ticks have four distinct life stages: egg, two nymph stages, and adult. During each life stage after the egg stage hard ticks take only one blood meal. The time to completion of the entire life cycle may vary from less than a year in tropical regions to over three years in cold climates, where certain stages may enter diapause until hosts are again available.

The life stages of soft ticks are not readily distinguishable. Unlike hard ticks, many soft ticks go through multiple nymph stages, gradually increasing in size until the final molt to the adult stage. Soft ticks feed several times during each life stage, and females lay multiple small batches of eggs between blood meals during their lives. The time to completion of the entire life cycle is generally longer than that of hard ticks, lasting over several years. Additionally, many soft ticks have an uncanny resistance to starvation, and can survive for many years without a blood meal.

The sucking mouthpart of a tick is the hypostome, which has many barb-like projections on it. The backward directed projections prevent easy removal of the attached tick. In addition, most hard ticks secrete a cement-like substance produced by the salivary glands that literally glues the feeding tick in place; the substance dissolves after feeding is complete.

Many ticks seek hosts by an interesting behavior called "questing." Questing ticks crawl up the stems of grass or perch on the edges of leaves in a typical posture with the

front legs extended. Certain biochemicals such as carbon dioxide as well as heat and movement serve as stimuli for questing behavior. Subsequently, these ticks climb on to a potential host that brushes against their extended front legs. Once they have found a host, ticks may feed for extended periods of time, varying from several days to weeks, depending on such factors as life stage, host type, and species of tick. The outside surface, or cuticle, of hard ticks actually grows to accommodate the large volume of blood ingested, which, in adult ticks, may be anywhere from 200-600 times their unfed body weight.

Most soft ticks are nest parasites, residing in sheltered environments such as burrows, caves, or nests. The feeding behavior of many soft ticks can be compared to that of fleas or bedbug. They spend much of their time in the nest of the host, feeding only when the host returns and disturbs the contents.

There are several common ticks in California. The Western Black Legged Tick is a three-host tick that primarily feeds on lizards and small rodents during as a subadult, and large mammals as adults. It is the putative vector of the Lyme Disease spirochete and the Equine Granulocytic Ehrlichiosis rickettsia in California. Its distribution appears to be limited to the moister regions of the coastal and Sierra foothill ranges throughout the state. Humans bitten by these ticks may notice intense inflammation at the site of the bite that may be slow to heal. These sores do not necessarily indicate disease transmission by the tick but are instead an artifact of irritation due to salivary products injected into the bite site.

The American Dog Tick is a three-host tick that feeds primarily on rodents as a subadult, and large mammals, such as dogs and humans, as adults. It is the most important vector of the Rocky Mountain Spotted Fever rickettsia in the eastern U.S. and is also able to transmit the bacteria that causes tularemia (Hunter's Disease). This tick is widespread throughout the U.S. In California it is most frequently found along the coastal ranges down the length of the state, but has also been collected in the central valley and along the eastern Sierra range.

The Pacific Coast Tick is a three-host tick that commonly feeds on rodents, especially squirrels, as subadults, and on cattle, horses, deer, and humans as adults. This is one of the most widely distributed ticks in California. It is found throughout the state except for the very dry regions of the Central Valley and the southeastern desert region. It is not known to carry any human diseases.