

Lyme Disease (continued from page 3)

ticks on her, one of which was an *I. pacificus* tick. It seems some dogs bring their traveling companions to the park with them—the tick drops off, and eventually picks up a ride on another dog.

What can people do to protect themselves? Depending on the situation, several modified behavioral options are available to us. Here are the recommendations:

- ⇒ Wear light colored clothing so ticks can be seen and removed before they become attached to skin.
- ⇒ Wear long pants and long sleeved clothing.
- ⇒ Tuck pants into socks or boots, and shirt into pants.
- ⇒ Use approved repellents around shoes, ankles and on exposed skin. Be sure to follow the manufacturers instructions carefully!
- ⇒ Choose wide trails and walk in the center. Avoid brushy and grassy areas, as well as off-the-trail hikes.
- ⇒ Inspect yourself and others (including pets) thoroughly for ticks at least once an hour while walking in suspected tick-infested areas.

This behavioral modification is a pain, but the alternative (Lyme disease) is much worse.

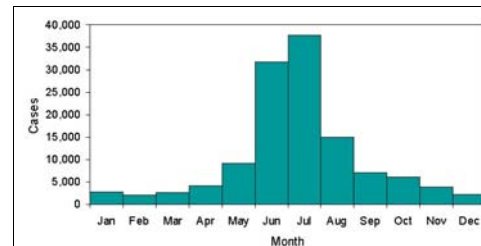
Life is not complete without more statistics! Nationally, in 2006 (most recent tabulation), there were 19,931 documented

cases of Lyme disease. In California, we only had 85 cases that met the prevailing diagnostic criteria. Many experts believe the number is much higher, and the criterion has now been modified to give a more realistic representation of Lyme disease infection, and risk in California. Geographically, and populationally smaller states have exponentially more cases, like New York with 4,460 cases, New Jersey with 2,432, Connecticut with 1,788, and Wyoming 1,466, all in the same year. The overall infection rate of our California ticks is lower, but our population is much higher. The percentage of infected adult deer ticks in Lyme disease endemic areas, such as Connecticut, is 30 to 60%.

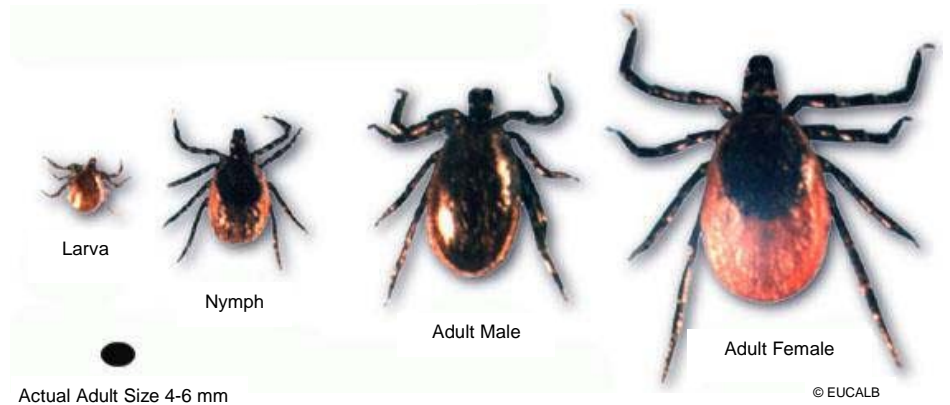
There is research that suggests that our local lizards may be responsible for decreasing the infection rate. An experiment allowing infected nymphal ticks to feed on the western fence lizard, and then metamorphosed into adult ticks—they were

no longer infected! A certain large protein present in this lizard's blood seems to be responsible for the mortality of the *Borrelia burgdorferi* spirochetes. California health officials have long been both pleased and puzzled by the low incidence of Lyme disease in the state despite an abundance of ticks. The isolation and synthesization of this protein may result in a cure for Lyme disease.

Spring is nymphal tick season!



Lyme Disease Cases by Month (CDC)



Keeping Spiders Out: An Effort

You can use several strategies to try to keep spiders out, or at least reduce the amount of spiders that enter your home. Many spider-lings are less than 1 mm in size, and this makes total exclusion of spiders from a home almost impossible. But here are some suggestions:

- ⇒ Have screens on window openings
- ⇒ Keep shrubbery cut back from the exterior sides of your home
- ⇒ Keeping the porch/exterior lights off at night, or at least on motion detection mode (reduces attraction of spider food)

- ⇒ Weekly rinsing with a garden hose, of the exterior of your home: under eaves, around windows and doors, and foundation, knocking down webbing
- ⇒ Alternatively, you can use a shop-vacuum to suck-up any spiders, and egg sacs in evidence

Interior:

- ⇒ Some people prefer to "capture and expel" spiders found indoors, but keep in mind that if they found their way in once, they may re-enter
- ⇒ The "wand" attachment for your household vacuum can be used to

suck up unwanted visitors, and it is very unlikely they would survive the trip, let alone crawl back out

- ⇒ It is important that door thresholds and sweeps fit snugly as possible to prevent spiders, and other things from crawling in
- ⇒ Openings in walls, around pipes, vents, and electrical outlets should be well fitted, and not be allowed to provide a highway for spiders

Remember: Most spiders are not interested in biting you, but all spiders are venomous, so treat them with respect!



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Alameda County Vector Control Services District



Our Mission:
Prevention of Vector Borne Disease in Alameda County

Volume 6, Issue 1

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Special points of interest:

- ◆ Cockroach infestation and asthma!
- ◆ Those innocent spiders!
- ◆ Immigrating spiders...
- ◆ Lyme disease: still the #1 Vector-borne disease in the US!
- ◆ Those cuddly bats!
- ◆ Can you keep spiders out of your home?

Integrated Vector Management (IVM)

IVM, what is this?

Most people have heard about Integrated Pest Management (IPM), in fact Alameda County has adopted an IPM policy that we follow. However, since in the field of vector control, we specialize in vectors of disease—we have our own symbiotic approach on our aim and goal of controlling vectors.

The most significant factor in IVM (and IPM) is *environmental manipulation*. This practice is where you modify potential habitat, and carrying capacity of the environment to limit available resources that contribute to vector population growth. Examples of this are; bagging, and covering of garbage to prevent fly breeding, and containerizing garbage to

exclude rats from having access to this food source. In mosquito control, you eliminate as many standing water sites, thereby reducing mosquito development locations and ultimately reduce mosquito populations. These practices are often labor intensive, and require widespread societal cooperation, but ultimately reduce the need for chemical (pesticide) application, or other lethal control measures.

Vectors are not just pests, but defined as vectors of disease, and animals that can cause injury to humans, such as ticks (*Lyme disease*), fleas (*plague*), flies (viruses, bacteria, protozoa, and filarial worms, and diseases such as *Leishmaniasis*, *Salmonella*,

Shigella, *Campylobacter*, *Escherichia*, *Enterococcus*, *Chlamydia*, etc.), and stings, or bites from venomous animals. This is not to say a moth, or cricket is not a potential problem for some people, but more than likely, they will not make you ill, or directly harm you.

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Yellow Sac Spider: A bite in the Night

Sac spiders belong to the genus *Cheiracanthium* and the family *Clubionidae*. They are quite small and easy to overlook—about 1/4 to 3/8 inches long, with no conspicuous markings. The front legs are longer than the other three pairs. Sac spiders are a common house species, and are quite pale; pale greenish, tan, or straw colored.

It is nearly impossible to determine precisely what type of spider has bitten someone, when no spider has been found, or seen inflicting the bite. Experts believe sac spider's cause more bites than any other type of spider and their bites are often misdiag-



nosed as brown recluse spider (*Loxosceles reclusa*) bites.

The venom of sac spiders contains a cytotoxin, which means it kills cells, as does the venom of the brown recluse spider. Unlike brown recluse bites, which can take 2-3 months to heal, most sac spider bites usually heal sooner, although the reaction will vary greatly from individual to indi-

vidual. These wandering/hunting spiders, usually come out of their silken retreat (sac) after dark, and hunt for prey. They have an unsettling tendency to drop on people, and often on a sleeping person. They do not bite to acquire a meal, but just to gain a firm purchase using their mandibles, and inadvertently inject venom. Their bite is not painful enough to wake most people, and the first thing (if anything) they notice is a small bump at the bite site. This bump usually heals right away, but some individuals may develop a necrotic wound that takes days, weeks, and sometimes months to heal.

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IVM (Continued from page one)

A case in Point

The cockroach is one vector that has a different mode of causing harm to people. This is their inadvertent methodology of harm: As the cockroach grows and develops they shed their exoskeleton (chitin), and over time these particles accumulate, crumble, and permeate the environment they live in—usually human dwellings. This chitin, their excretions, and wastes combine to produce severe allergens for people. According to the *Asthma and Allergy Foundation of America (AAFA)*, from 23 percent to 60 percent of urban residents with asthma are sensitive to the cockroach allergen. They further state: “Studies show that 78 percent to 98 percent of urban homes have cockroaches. Each home has from 900 to 330,000 of the insects.” I do not know how accurate these statistics are, and they may not apply to all urban

areas, nonetheless, cockroach infestations are still a problem, and specifically in multi-unit settings (apartment complexes).

In a study in Wilmington, Delaware, 20% of homes with no visible evidence of cockroach infestation had detectable levels of cockroach allergen in at least one room (Dust and Airborne Exposure to Allergens derived from cockroach..., J Allergy Clin Immunol 99:107-112, 1997).

Cockroach allergens appear to be associated with relatively large particles that remain airborne in detectable quantities for only a short time after disturbance, and are found to be nearly impossible to eliminate swiftly, or completely from infested dwellings.

Here is the IVM methodology: 1. The use of hydramethylnon or abamectin gel baits in all the units within a multi-unit complex. If professionally applied, and follow-

up is conscientious, complete control of the cockroach population is possible. 2. Thorough cleaning of all the units, including steam cleaning of carpets. 3. An aggressive caulking, and sealing of potential cockroach congregating areas. 4. Ongoing practice of strict sanitation, keeping cooking grease off kitchen walls, and food crumbs from floors and surfaces.

This IVM/IPM approach will work to greatly reduce existing allergen problems, but there is always the potential of re-introduction of the dreaded cockroach. The variables involved in multi-unit housing complexes make concerted, and ongoing effort difficult, though essential. Allergen levels can be reduced so they may not produce severe symptoms in the sensitive individuals, but there is little evidence of total eliminability.



Yellow Sac Spider (continued from page 1)

The brown recluse spider usually delivers a bit by ‘inadvertent’ contact. Specifically, they may be inside clothing that people put on, or under covers, and other locations where people push up against the spider, and being trapped against the skin—they bite.

One thing we know is that the brown recluse spider does not occur in Northern California, but surely, it has been brought into our area transported by RV’s, equipment, and other shipping. The interesting detail is why it does not become established. This can only be due to competition from another spider that already occupies

the niche they need. I have my suspicion, but no facts but—in my garage I have a resident population of black widow spiders (*Latrodectus hesperus*), and have cellar spiders, *Holocnemus plucheii* (universally known as “daddy longlegs”) like most other people. The well-tolerated cellar spider kills black widow (and wolf) spiders in my garage! At first, I found this hard to believe, due to the skinny long legs, and small body. I think their advantage stems from the long legs, and the way they use their silk as an offensive entangler, giving them an opportunity to deliver a bite, and then retreat. The cellar spider then takes over

the black widows hunting location. The cellar spider is also unique in our area by living in colonies. I have a group of 70+ living on one porch, with “big momma” in the center, and the rest radiating out. Most other spiders disperse, and are not inhibited in eating one another. A related species (there are about 40 species found north of Mexico) lives in colonies numbering in the millions, in the jungles of South America.

Yellow Sac Spider in Retreat



Mediterranean House Spider: *Zoropsis spinimana*

On January 26, 2006 an article appeared in the San Francisco Chronicle’s SFGate.com, written by Keary Davidson, describing a spider that recently has gained a foothold in the Bay Area. This spider is a large spider for our region (1.5”-2” in leg/body combined), and one glimpse will be enough to catch your attention.

On February 13, 2006 we received a call from a Fremont resident that had captured a large spider (described as large as a silver dollar). They e-mailed us a picture, and we asked them to bring the arachnid in for identification. When they brought the spider in the initial thought

was that it was a large wolf spider, which is a member of the family *Lycosidae*. Though of the same size as a large wolf spider, the markings were unusual for this family. Recalling the article describing the *Zoropsis spinimana*, we decided to contact Darrell Ubick, from the Department of Entomology at the California Academy of Sciences, the interviewee in the SFGate.com article.

After sending the initial photograph, Darrell said it looks like *Zoropsis spinimana*, but a good picture of the eyes would clinch the identification. This spider was very cooperative and did not show any aggressive tendencies, and we had a

photo session, that revealed this arachnid to be a handsome fellow. With a good look at the eye pattern, Darrell confirmed our guest as the new Mediterranean migrant, hoping for a new start in the New World.

January 24, 2008 we received another confirmed specimen from Oakland. This was a female and now we have many spider-lings! There must be enough males and females around to keep the species going. On thing I did notice when I went to pickup the spider: no daddy-longlegs! Could it be our local cellar spider has met its’ match!



Lyme Disease: The Most Reported Vector-borne Disease In the US

Lyme disease is a preventable bacterial infection transmitted to humans in California by the bite of the Western Black-legged tick (WBLT), *Ixodes pacificus*. Lyme disease was named for Old Lyme, Connecticut where it was first recognized in 1975. The first cases of the disease in California were diagnosed in 1978, and even with the spread West Nile Virus, Lyme disease is still the most reported vector-borne disease in the United States.

On average, only about 1 to 2% of the adult WBLT, and 2-15% of the nymphal-stage ticks are infected in California. In one woodland site in Mendocino County, however, 41% of the nymphs were found

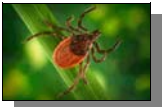
to contain Lyme disease spirochetes (spiral shaped bacteria), *Borrelia burgdorferi*.

In Alameda County, our surveillance has detected the 1-2% local infection rate in adult WBLT. This year we plan an intensified effort to determine the infection rate for the nymphal stage ticks. The nymphal stage ticks are so small (size of a poppy seed, 1/13 to 1/9 inch, 2-3 mm) that there is a tendency for them to get on people and animals, and remain undetected. Combine this to the very high infection rate, compared to the adult stage; we have a problem.

A few years ago in Tilden Park, one researcher found many nymphal ticks on

a telephone pole, type-parking barrier. This was quite a surprise, when we usually think of nymphal tick habitat as being in leaf-litter. Much of the prevalence studies have found nymphal ticks on tree-trunks, and fallen logs, as well as leaf litter. This tells us you can pick up one of these minute, and potentially infected ticks, just setting on a log, or leaning against a tree in a forest setting—unsettling!

Another often overlooked setting to pick up ticks is in dog-parks. A few years ago, I took my American Eskimo dog to a “dog park,” and subsequently found several (continued on page 4)



Bats, Rabies and Humans

Bats are good and beneficial animals, right? Certainly, but bats are the animal we most often detect with rabies, and due to this fact it is an animal of specific concern as a vector of this potentially fatal viral disease.

The rabies virus is shed in the saliva of the infective animal, and is transmitted through saliva contact. What this means is that when a “rabid” animal bites you, the saliva containing the rabies virus is injected into the wound produced by the animal’s teeth. Additionally, infected saliva can enter a scratch, or mucosa, and this makes any contact with a suspect animal a serious event, since rabies is fatal. Rabid animals may have saliva on claws, adjacent surfaces, or other body parts, heightening the risk to other mammals.

Here are the California statistics relating to rabies infection from 1997 through 2006: 1,630 bats, and 1,065 skunks were detected with rabies, our other animals had far less incidence; 43 foxes, 18 dogs, 15 cats, 5 opossums, 3 raccoons, 2 in each cattle/horse/dog-wolf hybrids, and 1 case in each rabbits/goat/sheep. The bat, as well as skunk rabies statistics are exponentially higher in comparison, but unfortunately, our domestic dogs and cats are far higher than they should be. More humans perished due to rabies (6) than most of the other detected animal species, with a mean of 2-3 fatalities per species (excluding humans).

Why exclude humans? We know for certain how many people died from rabies, but as far as surveillance of other animals, surveillance is somewhat accidental—the only animals diagnosed are those turned in for testing, and with the wide geographical

area of California, this is just spot-testing, and only gives a statistical likelihood of rabies infection per species. Most human cases in the US are derived from bat rabies, though on our East Coast the animal most often detected with rabies is the raccoon.

There are various *types* (ecotypes) of rabies virus, and they can be traced to the species of animal that is their regional reservoir host. In Europe the main reservoir hosts are: fox and bats, in the Middle East: wolf and dog, in Asia: dog, in Africa: dog, mongoose, antelope, in North America: foxes, skunks, raccoons, and insectivorous bats, in South America: dog and vampire bats. In the United States, we have made great public health strides in reducing, and virtually eliminating canine rabies through nationwide dog vaccination programs, and animal control procedures that insure our wonderful companion animals stay free from this preventable (through vaccination, and quarantine) deadly zoonotic disease.

What fascinates me about rabies is how this deadly virus manages to maintain itself in wild animal populations. A virus with a 100% mortality rate would seem to be on a short cycle out. The key factor must be the resistance within the host species themselves.

Since 1990, 11/56 human rabies fatalities in the US, were in California, and 6/11 were from our indigenous bats. The other 5 cases were contracted out of the contiguous United States. That leaves us with a bat rabies problem, and when we consider one of the characteristics of skunks (odorous), it is little wonder people avoid contact with them.

Why do people have this contact with

bats you may ask? Partially, it may be that due to the small size of our Mexican/Brazilian free-tailed bat, and their positive reputation—they are viewed as non-threatening, and beneficial.

A case in point: a recent (May 2008) situation where a local woman removed a bat from her dogs’ mouth, and brought it to her health care provider, with the question of “what to do about the bat?” The bat subsequently tested positively for rabies—she had to undergo rabies post-exposure treatment, and as it turned out, her dog had a lapsed rabies vaccination, which dictated a six-month quarantine (she opted to have the dog euthanized). The moral of this story is to keep your pets’ rabies vaccine up-to-date—a lapsed, or unvaccinated dog, or cat that has contact with a suspect rabid animal will have to suffer six-month rabies quarantine. This means isolation without contact with other animals or people. This creates a very difficult situation for an animal, and guardian. Part of the problem that dictates the 6-month quarantine is the variability of incubation period of the rabies virus after exposure—the viremia can culminate anytime within this time frame.

There has only been one person in the United States, that has survived rabies infection, and this was through a novel approach utilizing chemically induced coma to slow the spread of the infection, and give the doctors time to work on a symptomatic therapy, combined with aggressive experimental antiviral treatment. This took 76 days of hospitalization: this is the million-dollar approach, which has yet to be repeated with success. Just the post-exposure vaccine treatment can cost close to \$1,500.00.