

Oil of Lemon Eucalyptus (cis-&-trans-p-menthane-3,8-diols) is another product that is new on the market. The 40% formulation provides protection for up to 6 hours, which is comparable to the higher concentrations of Picaridin (15%), and DEET at 14%. Preliminarily, a real contender—but again the long term research is not available on this botanical oil, only marketed as a mosquito repellent since 2002.

Skin-So-Soft Bug Guard® is a product by Avon, with a proprietary formulation (IR3535), that has been used as a mosquito repellent (Skin-So-Soft) for years. Duration of effectiveness ranges from 10 minutes to 2 hours (CR 2000; NEJM 2002). This may be long enough in some situations.

Soybean Oil that contains Palmitic acid, Stearic acid, Oleic acid, Linoleic acid, and Linoleic acid, is another documented repellent. The brand *Bite Blocker®* with 2% soybean oil has shown a duration of efficacy of 16 minutes to 4 hours (CR 2000; NEJM 2002). This is certainly a useful product in some situations.

The mosquito species used for testing mosquito repellents are an important determinant in duration times. Some mosquitoes are biters that are just more aggressive, other mosquitoes are efficient vectors of disease, and some are both!

Considerations: Plan if you can, and be prepared. If you know that you are going to be out in mosquito, fly, or tick land, select the repellent products that will best serve the situation. If you plan to be out less than an hour, Skin-So-Soft, or a soybean oil product may serve well, but if you plan to be out for

several hours, DEET, Picaridin, or oil of lemon eucalyptus should be selected.

Fabric applied repellents contain permethrin, which is an insecticide. Arthropods usually die from contact. These aerosol products work well on tent walls, sleeping bag exteriors, clothing and shoes. The product label will give the expected duration of effectiveness after application, and should only be reapplied upon label recommendations.

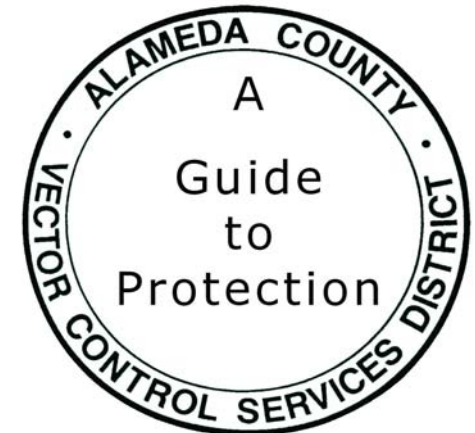
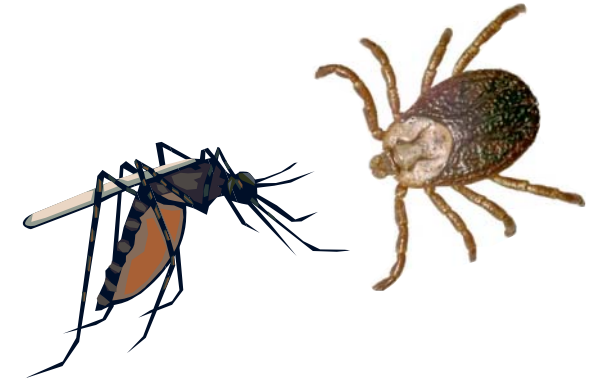
Always follow product labels!
These give guidelines for the established safe use of the product!



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Arthropod Repellents

(mosquito, tick, mites and biting flies)



Repellent Types

There are two basic types of arthropod* repellents:

- Repellents for skin application
- Repellents for clothing and fabric

Do not use repellents designed to be used on fabric, on your skin. These are pesticides, and can be toxic if applied to skin. Always follow product label directions!

Repellents formulated to be used on skin are usually not effective when used on fabric. Most of these products are formulated specifically to be used safely on the skin. Always follow product label directions!

Why Use Repellents?

Disease prevention is the primary reason for repellent usage. Arthropods such as ticks, mosquitoes, mites, body lice, flies, and fleas are *vectors* of disease. Lyme disease (LD), West Nile Virus (WNV), Rocky Mountain Spotted Fever (RMSF), are serious diseases, and personal protection strategies will go a long way in preventing them.

Blood-sucking, or feeding arthropods inadvertently deposit pathogens when feeding on host animals. Many of these pathogens are present in such small quantities, that our immune system defends us, but this is not always the case! Who likes being bitten by blood-sucking arthropods?

* *Arthropods are insects, such as mosquitoes, flies, lice, and fleas. They are also arachnids, such as ticks, mites, and spiders.*

Avoidance & Clothing/Dress

Avoiding mosquito-feeding times of most mosquitoes; dawn and dusk, can certainly help reduce exposure.

Some parks have *tick* warning signs posted—to let you know they occur in the park. By staying on trails, avoiding walks through brush, or sitting in leaf-litter (immature/nymphal tick habitat), you can keep your distance from some blood-feeding arthropods, and lessen the potential of contracting a vector-borne disease.

Clothing and proper dress can also limit your exposure to arthropods. This may not be very appealing; long pants, and a long sleeved shirt on a warm sunny day, but can certainly aid in protecting you. **Wear:**

- Long pants, and tuck pant-legs into socks, or boots; tape where pants and socks meet.
- Light colored clothing should be worn so you can spot ticks, fleas, or mosquitoes
- Long-sleeved shirts; tuck into pants, and bind shirt at wrist.

Repellents

Skin applicable repellents come in a variety of formulations, with the most common and widely tested being DEET (N,N-Diethyl-*m*-toluamide). Here is a list of repellent products:

DEET (N, N-diethyl-*m*-toluamide) has been the industry standard for 50 years, but is not without problems.

- About 50% of the topically applied DEET is absorbed through the skin into systemic cir

ulation within six hours. Oxidative enzymes in the liver metabolize the majority, and about 10% to 15% of each dose can be recovered from the urine.

- Toxic and allergic reactions have been reported from DEET use. The chemical has been associated with bulbous eruptions (blisters) and contact urticaria (hives).
- Toxic encephalopathy has occurred with excessive or prolonged use of DEET, particularly in infants and children. (D. Edwards and C. Johnson, Clin Pharm, 6:496, 1987)

With the above acknowledgment, microencapsulated, time-released DEET formulations are much safer, in that they “encapsulate” the DEET and provide for a “time release” to prolong the effectiveness of lower concentrations. The microencapsulated product *Ultrathon®* contains 33% DEET and lasts as long as the *Off Deep Woods for Sportsmen®* 100% DEET product: 11-13 hours.

DEET product concentrations range from 4.75% to 100%, with an effective duration of 45 minutes to 13 hours (Consumer Reports 2000; New England Journal of Medicine 2002).

Picaridin ((RS)-sec-butyl 2-(2-hydroxyethyl) piperidine-1-carboxylate) is a relative newcomer on the market, with a track record going back to 1998. It has a reported efficacy duration of 3 to 6 hours, formulation, and concentration dependent. The major brand with 7% concentration lasts a little longer than 3 hours.

Picaridin, being new compared to DEET, which began public use in 1957, has not withstood the rigors of scrutiny over time.