

# Protecting Yourself from Disease Carrying Insects

**A Reference Guide to  
Mosquitoes, Ticks,  
West Nile Virus and  
Lyme Disease**



**ARLINGTON**  
VIRGINIA

**Dear Arlington County Resident,**

Arlington Public Health wants to minimize your risk of West Nile virus and Lyme disease transmission. We are providing you the brochure "Reference Guide to Mosquitoes, Ticks, West Nile virus and Lyme Disease" to help you understand how to better protect yourself, your family and your yard from mosquitoes, ticks and the diseases they transmit.

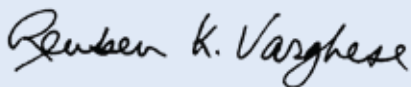
Well-informed and active residents are necessary partners to combat disease carrying insects in our community. Education, preparation and action are important factors in breaking the disease transmission cycle.

Please take a few minutes to read about West Nile virus and Lyme disease; then prepare and act to protect yourself and your family from insect-borne disease. Environmental Health staff is also available to discuss your questions about methods to control and prevent disease transmission by insects.

We hope this brochure is helpful to you and your family. Thank you for taking the time to read this valuable information. Please contact us with questions about this information. We may be reached at 703-228-7WNV (7968) or email us at [ehealth@arlingtonva.us](mailto:ehealth@arlingtonva.us)

Working together we can more effectively control and prevent insect-borne disease transmission in our community.

Sincerely,



Reuben Varghese, MD, MPH  
Health Director  
Public Health Division  
Arlington County, Virginia

This document was prepared by The Fairfax County Health Department Disease Carrying Insects Program to whom we are grateful for allowing its reproduction.

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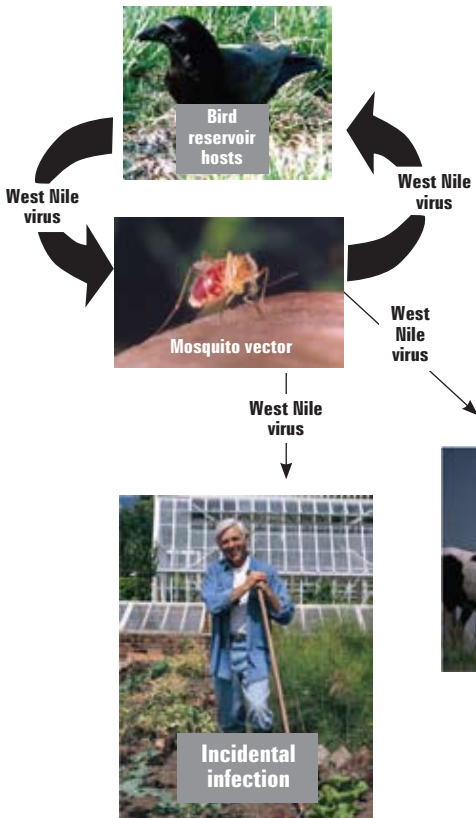


# West Nile Virus and Mosquitoes

## What is West Nile Virus?

West Nile virus (WNV) is a virus that is transmitted to people by the bite of an infected mosquito. WNV was first detected in Arlington County in 2000 and has since affected many residents.

## The West Nile Virus Transmission Cycle



Courtesy of CDC

## The West Nile Virus Transmission Cycle

- The natural transmission cycle of West Nile virus is between a few types of birds and some mosquitoes.
- Very few mosquitoes are actually infected with the West Nile virus.
- A bird infected with WNV is bitten by a mosquito.
- The mosquito picks up the virus from the bird and after about a week, the mosquito can transmit the virus.
- The infected mosquito will then feed on an uninfected bird and transmit the virus to the bird.
- Sometimes, the infected mosquito will feed on humans or horses. Some of these humans and horses can get sick or die from the infection.

### Incidental infection



## What are the Signs and Symptoms of West Nile Virus?

Symptoms generally appear three to 15 days after being bitten by an infected mosquito.

- **SERIOUS SYMPTOMS in a few people:** About one in 150 people infected with West Nile virus will develop severe illness. This may include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness or paralysis. These symptoms may last several weeks and neurological effects may be permanent. West Nile virus infection can be fatal.
- **MILDER SYMPTOMS in some people:** Up to 20 percent of people infected with West Nile virus develop West Nile fever, symptoms of which may include fever, headache, body aches, nausea, vomiting and sometimes swollen lymph glands or a skin rash on the chest, stomach and back. Symptoms may last a few days to several weeks.
- **NO SYMPTOMS in most people:** Approximately 80 percent of people who are infected with West Nile virus will not show any symptoms at all.

## Who is at Risk for West Nile Virus?

While everyone is equally susceptible to West Nile virus, people over the age of 50 are at greatest risk for developing more severe forms of the disease. No vaccine against WNV is available for people at this time.



## The Mosquito Life Cycle

- There are four stages in the life of a mosquito: egg, larva, pupa and adult.



Mosquitoes eggs are laid so that they hatch in water.



A larva emerges from the egg and feeds and grows in the water for about a week.



The larva then turns into a pupa, which is also found in water but does not feed.

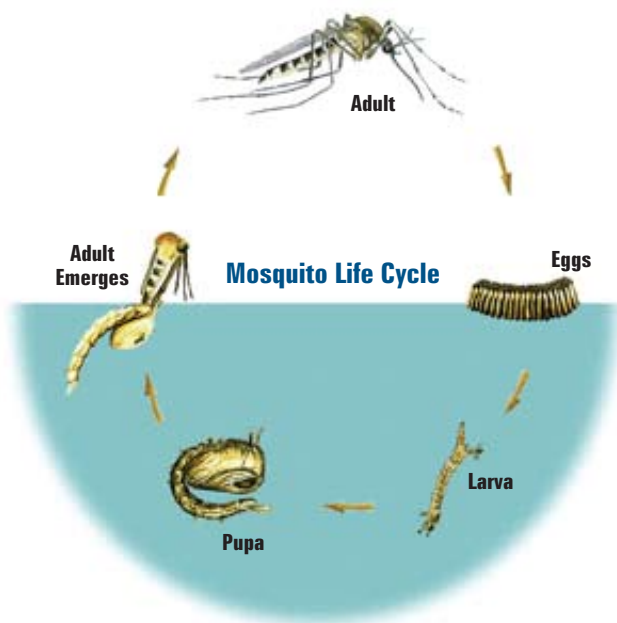


After about two days, the adult mosquito that has developed inside the pupa will emerge into the familiar flying form.



There are both male and female mosquitoes, but only the female bites because she needs the blood to provide nutrients for her eggs.

- Female mosquitoes will lay 200-300 eggs each time they have a blood meal. She may lay eggs three or four times during the month that she is alive.



*Courtesy of Leon County Mosquito Control*

## How to Get Rid of Adult Mosquitoes Around Your Home

- Applying a permethrin barrier spray to your yard will provide temporary relief from biting adult mosquitoes.
- Permethrin is an insecticide that both repels and kills mosquitoes.
- Permethrin has low human toxicity and is readily available in garden centers and hardware stores.
- When looking for permethrin products, make sure to check the labeling—permethrin is the name of the active ingredient, not the product brand name.
- Apply permethrin to ivy, shrubs, trees, ornamental grasses and to any other plants where mosquitoes are resting.
- Permethrin will not harm your garden plants.
- Treatment will last two to three weeks, depending on the rain.
- Reapply as needed depending on mosquito presence and annoyance.
- Always read and follow the label instructions before applying insecticides.

### Applying Permethrin to Vegetation





## ***Culex* Mosquitoes and West Nile Virus**

**Scientific names:** *Culex pipiens*,  
*Culex restuans*

**Appearance:** Small, brown mosquito.

**Personality:** Shy, not aggressive;  
likes to feed from dusk until dawn.

**Her Favorite Meal:** Birds, but she will  
occasionally feed on mammals.

**Preferred Breeding Sites:** Stagnant,  
organic, nutrient-rich water. Places  
like catch basins (storm drains),  
clogged rain gutters and sites where  
the water stands for a longer period  
of time (usually a few weeks).



**Hangouts:** Adults like to spend  
time in trees, bushes and tall grass  
during the day—as long as it's cool  
and humid.

**Health Risk:** These are the most  
important mosquitoes in the West  
Nile virus transmission cycle. Even  
though they prefer to feed on birds,  
they will bite humans, horses and  
other mammals, which can get sick if  
they become infected.

**Additional comments:** These  
mosquitoes are not as aggressive as  
other mosquitoes, so you may not  
notice when one is biting you—  
another good reason to wear insect  
repellent.



*Courtesy of CDC*

The Arlington County Public Health  
Division has a pro-active catch-basin  
treatment program to help reduce  
the number of mosquitoes.

Be sure to use the “Breeding Site  
Check List” on page nine to help  
get rid of mosquito larvae around  
your home.



# The Asian Tiger Mosquito: Arlington County's #1 Nuisance Mosquito

**Scientific name:** *Aedes albopictus*

**Appearance:** Black mosquito with striking white markings on the body and legs.

**Personality:** Very aggressive; daytime biter.

**Her Favorite Meal:** Human blood—though she will feed on other mammals and birds, as well.

**Preferred Breeding Sites:** Artificial containers that hold water for seven days or more. Female mosquito lays her eggs in tires, buckets, flowerpots and corrugated drain pipes.



**Black corrugated pipes, above or below ground, are the most important breeding site for the Asian tiger mosquito.**

**Hangouts:** Anywhere cool, humid and shady. Ivy and azaleas or other bushes are among her favorite resting places.



*Courtesy of CDC*

**Health Risk:** These can transmit West Nile virus, but they are not very good at it. They are very annoying when you are trying to enjoy time in your yard.

**Additional Comments:** This mosquito does not travel far from their breeding sites. To help get rid of these, check your yard for any kind of container that may be holding water. While searching for a blood meal these mosquitoes may fly from yard to yard.

Make sure corrugated drain pipes are placed so they do not hold water. If above ground, empty them once a week. Otherwise, place a Mosquito Dunk® inside the pipe to prevent mosquitoes from breeding. Replace the dunks once a month during mosquito season. Use a piece of string to secure the dunk in the pipe or gutter to prevent it from being washed away.

## Stop Mosquitoes Where They Start: How to Eliminate Mosquito Larvae Around Your Home

### Every Week

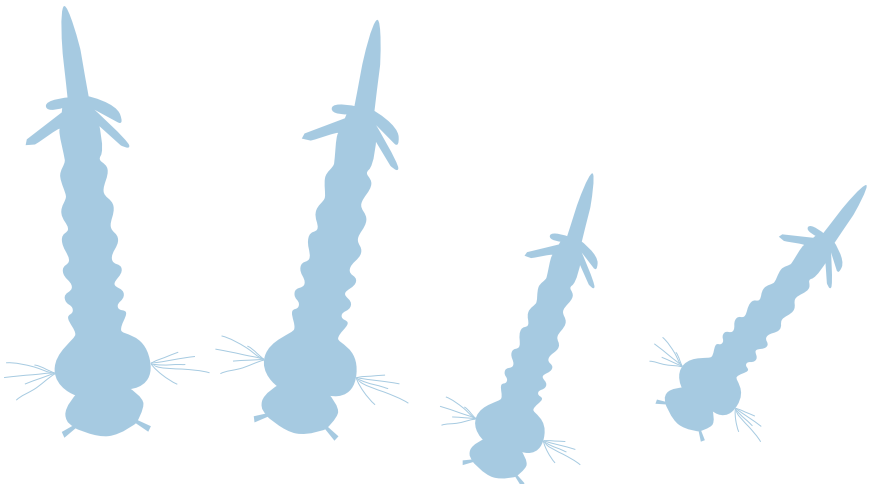
- Eliminate standing water from containers such as flowerpot saucers, watering cans and buckets.
- Change the water and clean bird baths, at least once a week.
- Empty water that collects in folds of tarps used to cover woodpiles, boats, etc.
- Position corrugated drain pipes to ensure drainage or dump out water.

### Once a Month

- Apply a larvicide (an insecticide applied to water to kill mosquito larvae), such as Mosquito Dunks®, to standing water that cannot be tipped and tossed or drained.

### As Necessary

- Clear debris to allow water to flow freely from drainage ditches and culverts.
- Clean leaves and debris from roof gutters.
- Recycle/dispose old tires. Call 703-228-6570 for disposal information.
- Filter or aerate ornamental ponds using a circulation pump or stock the pond with fish.
- Drain or fill-in puddles and areas of your yard that remain wet and soggy for more than a week.
- Check window and door screens and repair as needed to ensure that mosquitoes cannot enter.
- Organize a neighborhood clean-up.



# BREEDING SITE Check List

## Potential Breeding Site

## How to Correct

<input type="checkbox"/> Roof gutters	Clean out leaves and debris frequently to ensure water flows freely and does not accumulate.
<input type="checkbox"/> Black corrugated pipes for downspout drainage	Grooves in plastic pipes can hold enough water to breed mosquitoes. Treat with a larvicide.
<input type="checkbox"/> Buckets, watering cans, drinking glasses, plastic cups, bottle caps or any trash that can hold water	Store indoors or turn over. If trash, recycle or throw away.
<input type="checkbox"/> Cans and containers	Throw away, store indoors, turn upside down, drill holes in the bottom, or empty after rain showers.
<input type="checkbox"/> Old tires	Recycle/dispose or store where they won't collect rainwater. For playground use, drill water drainage holes. Call 703-228-6570 for disposal information.
<input type="checkbox"/> Bird baths	Change the water or flush out and clean with a garden hose at least once a week.
<input type="checkbox"/> Ornamental ponds	Stock with fish (fish eat mosquito larvae), filter/aerate the water with a recirculation pump or treat with a larvicide as needed.
<input type="checkbox"/> Potted plants with saucers	Empty saucers or flush out with garden hose once a week.
<input type="checkbox"/> Dripping outdoor faucets and window air conditioners	If water puddles, repair faucet. Place rocks under window air conditioner to ensure water runoff.
<input type="checkbox"/> Swimming pools	If unused or abandoned, treat with Mosquito Dunks® once a month. Mosquitoes can't breed in maintained swimming pools because of the chemicals used.
<input type="checkbox"/> Children's toys	Store indoors or in a manner that prevents water accumulation. Note that some toys have inner compartments that can hold water.
<input type="checkbox"/> Tarps on woodpiles and garden equipment	Empty water that collects in folds and sagging areas. Tighten or straighten so water runs off.
<input type="checkbox"/> Wheelbarrows	Turn over when not in use.
<input type="checkbox"/> Under decks, porches or outbuildings	Fill in depressions where water can collect. Remove any container that can collect water.
<input type="checkbox"/> Garbage cans, recycle bins, other barrels	Keep covered or drill drainage holes in bottom. Place lids on garbage cans. Store bins and barrels to allow water runoff.
<input type="checkbox"/> Canoes, boats	Cover with a tight-fitting tarp or store upside down.

# Lyme Disease and Ticks

## What is Lyme Disease?

Lyme disease is an illness caused by bacteria that are transmitted to people by the bite of an infected tick. Ticks become infected after feeding on white-footed mice that are carrying the bacteria.

The black-legged tick, also known as the deer tick, is responsible for transmitting the bacteria that causes Lyme disease. Tick activity is seasonal, with higher tick activity in the spring and summer. Ticks feed slowly and infected ticks will not transmit disease until they have been attached for several hours.

### Bull's-eye Rash



*Courtesy of CDC*

## What are the Signs and Symptoms of Lyme Disease?

**The first sign of infection** is usually a bull's-eye rash that appears three to 30 days after the bite. Not all persons develop this rash. Infected persons also experience fatigue, chills, fever, headache, muscle and joint aches and swollen lymph nodes. If you experience these symptoms, especially with the history of a recent tick bite, contact your physician.

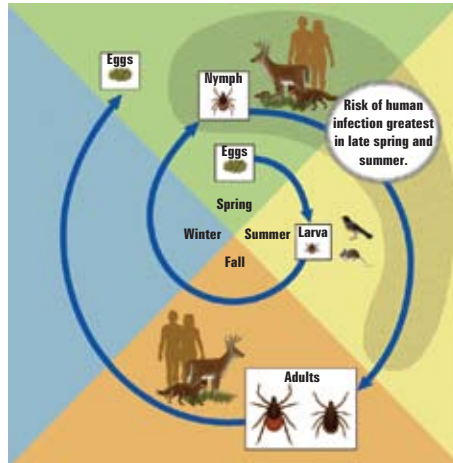
**If untreated**, the infection may spread to other parts of the body. This can produce a number of other symptoms that may appear separately, including loss of muscle tone on one or both sides of the face, severe headaches and neck stiffness, shooting pains, heart palpitations, dizziness and pain that moves from joint to joint.

**After several months**, about 60 percent of untreated cases begin to have intermittent bouts of arthritis with severe joint pain and swelling. Up to five percent of untreated cases may develop neurological complaints.

**Lyme disease is treatable if detected early. Remember, not all ticks transmit Lyme disease!**

# The Tick Life Cycle

## Black-legged tick life cycle



*Courtesy of CDC*

- There are four stages in the two-year life cycle of a tick: egg, larva, nymph and adult.

• The eggs hatch into larvae, often called “seed ticks”.

• Larvae attach to a host, take a blood meal and change into nymphs.

• Nymphs will attach to another host, take another blood meal and change into adults.

• Adult females will take yet another blood meal from a third host, become engorged (sometimes to the size of a small grape) and fall off. Each female will eventually lay about 3,000 eggs on the ground.

## How small is the black-legged tick?



*Courtesy of CDC*

## Protect and Check: Preventing Tick Bites

### AVOID TICK-INFESTED AREAS

- If you go into an area that could be infested with ticks, walk in the center of established trails.
- Try to avoid contact with overgrown grass, brush and leaf litter where the ticks might be waiting.

### DRESS APPROPRIATELY

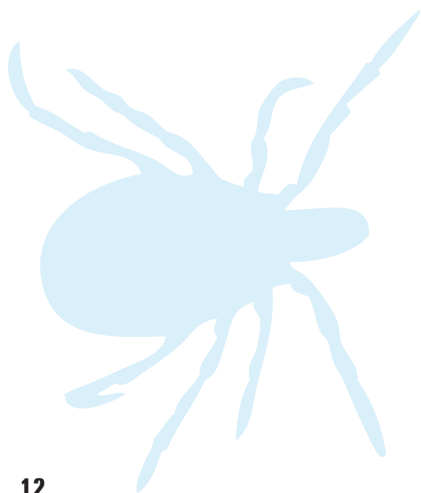
- Wear long-sleeved shirts and long pants to help keep ticks off your skin.
- Wear light-colored clothing so that ticks are easier to see.
- Tuck pant legs into socks and tuck shirt into pants.
- Keep ticks from crawling under your clothes by taping around the top of your socks where they meet your pants.
- Pre-treat clothes with 0.5% permethrin.

### USE TICK REPELLENT

- Apply 30% DEET (or other effective tick repellent) to exposed skin.
- Protect your pet with a specially treated collar or spot-treatment—ask your veterinarian if you have any questions. These products are only for pets. **DO NOT** use these products on people.

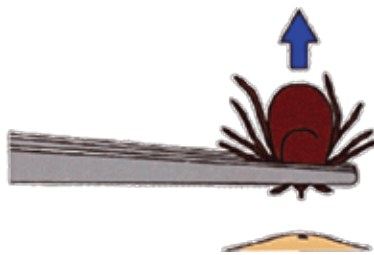
### CONDUCT FREQUENT TICK CHECKS

- Check yourself, your children and your pets for ticks after all outdoor activities because you may not be aware that a tick has found you.
- Look for ticks anywhere on the body, but especially in warm, dark areas such as the armpit or groin.
- Pay special attention to the scalp.
- Remove and dispose of unattached ticks.
- If you find an attached tick, use the proper method for removal, as described on the next page.



## How Do You Properly Remove a Tick?

- Prompt removal of an attached tick may help prevent infection.
- Use fine-tipped tweezers or shield your fingers with a tissue, paper towel or rubber gloves when removing the tick.
- Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure.
- **DO NOT** twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin.
- **DO NOT** use nail polish, petroleum jelly, alcohol or heat to remove the tick.
- **DO NOT** squeeze, crush or puncture the tick because its fluids may contain infectious bacteria.
- After removing the tick, clean the bite site with an antiseptic and wash your hands with soap and water.
- If you become sick, see a physician.



*Courtesy of CDC*

You can call VA Cooperative Extension for questions regarding tick identification at 703-228-6400.





# How to Make Your Yard a Tick-free Zone

## PRACTICE TICK-SAFE LANDSCAPING

- Ticks need high humidity levels to survive.
- Create a sunny and dry area where ticks cannot survive:
- Remove leaf litter and clear tall grass and brush around houses and at the edges of lawns.
- Lay down wood chips or gravel between lawns/recreational areas and wooded areas.
- Keep playground equipment, decks and patios away from yard edges and trees.

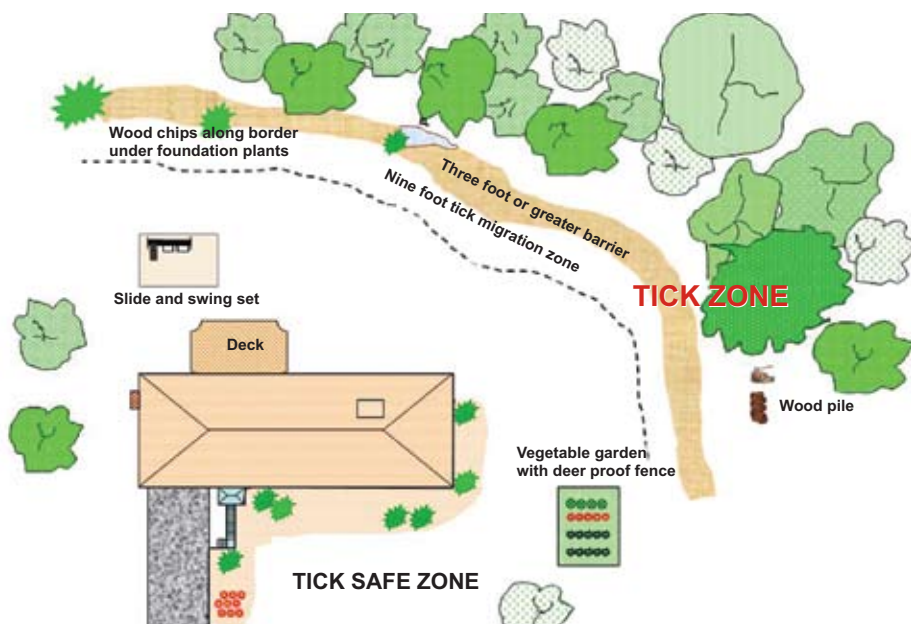
## USE CHEMICAL CONTROL

- Use **permethrin** to effectively control ticks in your yard.
- Make the first application between late March and early May.
- Reapply according to the label.

## DISCOURAGE DEER

- Deer bring ticks into your yard.
- Remove plants that attract deer.
- Plant deer-resistant shrubs and plants.
- Construct physical barriers to discourage deer from entering your yard.

## Landscape to create Tick Safe Zones



Adapted from CT Agricultural Experiment Station

# Repellents

## What is the Best Repellent?

### DEET

Repels Mosquitoes	Yes
Repels Ticks	Yes
Hours of Protection (23.8% formula)	5
Use in Children	Over 2 months
CDC* Recommended	Yes

DEET-based repellents have provided effective, dependable protection since the 1950s. They are available in various concentrations and their length of effectiveness is usually related to concentration. These products are available as aerosols, pump sprays or wipes. DEET is the most effective and best studied repellent available.

### Picaridin

Repels Mosquitoes	Yes
Repels Ticks	Maybe
Hours of Protection (15% formula)	4-8
Use in Children	N/A
CDC* Recommended	Yes

Picaridin is a synthetic repellent developed in the 1990s that has been commercially available in the U.S. since 2005. It is colorless and nearly odorless. Like DEET, the length of effectiveness is related to concentration. It is available as an aerosol, pump spray or wipe.

### Oil of Lemon Eucalyptus

Repels Mosquitoes	Yes
Repels Ticks	Maybe
Hours of Protection (25% formula)	4
Use in Children	Over 3 years
CDC* Recommended	Yes

Oil of lemon eucalyptus is a natural, plant-based repellent that is derived from tree leaves. Its effectiveness is similar to products containing low concentrations of DEET. Products tend to have a strong botanical smell and are available as pump sprays or lotions.

\*Centers for Disease Control and Prevention

## What You Should Know About Your Children and DEET

Everyone, especially children, likes to spend time outdoors. It's a good idea to protect yourself and your family from disease-carrying insects.

The Arlington County Public Health Division recommends using DEET and the American Academy of Pediatrics Committee on Environmental Health has reported that products containing up to 30% DEET are safe to use on anyone over two months of age.

Parents should choose the type and concentration of repellent to be used on their children based on the amount of time the child will be outdoors.

- When applying repellent:



**DO NOT** spray the face.



Spray repellent on your hands and rub onto exposed areas.



Avoid the eyes and mouth and use sparingly around the ears.

- **DO NOT** apply repellent to children's hands, because children put their hands in their mouths.
- **DO NOT** allow children to apply repellent by themselves; have an adult do it for them.
- Keep repellents out of reach of children.
- Always read and follow label instructions.

### Apply Repellent to Your Children



*Courtesy of R. Castañeda*



Department of Human Services  
Public Health Division  
Environmental Health Program  
2110 Washington Blvd., Suite 350  
Arlington, VA 22204

For more information about Mosquito control and prevention  
call the Environmental Health program at 703-228-7400 or email  
[ehhealth@arlingtonva.us](mailto:ehhealth@arlingtonva.us).

### **Web Sites**

Arlington Environmental Health Program  
[health.arlingtonva.us/environmental-health](http://health.arlingtonva.us/environmental-health)

Centers for Disease Control and Prevention (CDC)  
[www.cdc.gov](http://www.cdc.gov)

Virginia Department of Health (VDH)  
[www.vdh.virginia.gov](http://www.vdh.virginia.gov)

EPA Mosquito Control  
[www.epa.gov/mosquitocontrol](http://www.epa.gov/mosquitocontrol)

Virginia Mosquito Control Association (VMCA)  
[mosquito-va.org](http://mosquito-va.org)

Fairfax County Health Department  
[www.fairfaxcounty.gov/health](http://www.fairfaxcounty.gov/health)

Alexandria Health Department  
[www.alexandriava.gov/Health](http://www.alexandriava.gov/Health)