

# Mosquito & Tick Management: Pesticide Reduction for Pollinator Protection

## 2024

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*Issued in furtherance of Cooperative Extension work, Virginia Polytechnic Institute and State University, Virginia State University, and the U.S. Department of Agriculture cooperating. Edwin J. Jones, Director, Virginia Cooperative Extension, Virginia Tech, Blacksburg; M. Ray McKinnie, Administrator, 1890 Extension Program, Virginia State University, Petersburg.*

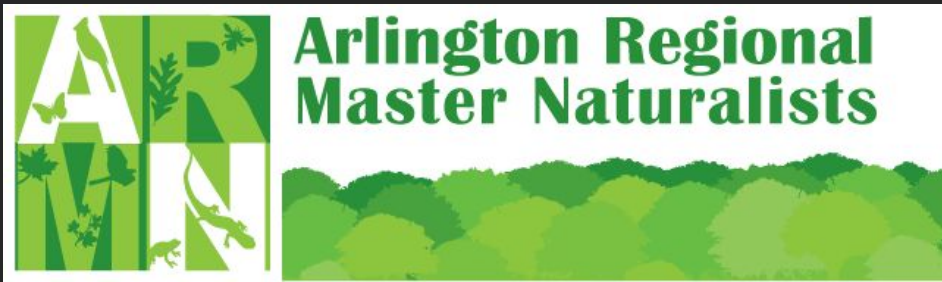


# Master Gardeners of Northern Virginia

- Virginia Cooperative Extension (VCE) -- [www.ext.vt.edu/](http://www.ext.vt.edu/)
- Volunteers serving Arlington & Alexandria
- Since 1985, promote public education on environmentally sound gardening practices
  - Help Desk
  - Plant clinics
  - Classes
  - Demonstration gardens, incl. organic vegetable garden
  - Arlington Central Library
- Website: [www.mgnv.org](http://www.mgnv.org)



Community Garden sign at Glencarlyn Library  
Community Garden. Photo © Judy Funderburk



The Arlington Regional Master Naturalist (ARMN) chapter of the **Virginia Master Naturalist Program** was formed in 2008.

Virginia Master Naturalists are trained and certified volunteer educators, citizen scientists, and stewards who help conserve and manage natural resources and public lands in Virginia.

For more details, volunteer opportunities, upcoming activities, & how to become an ARMN member, see: <https://armn.org/>.



Photo by Toni Genberg



Photo by Toni Genberg



Photo by Karen Thomas

# Program Outline

## Mosquitoes

- Basic facts and lifecycle
- Strategies for control and to protect yourself

## Ticks

- Basic facts and lifecycle
- Strategies for control and to protect Yourself
- What to do if you've been bitten by a tick

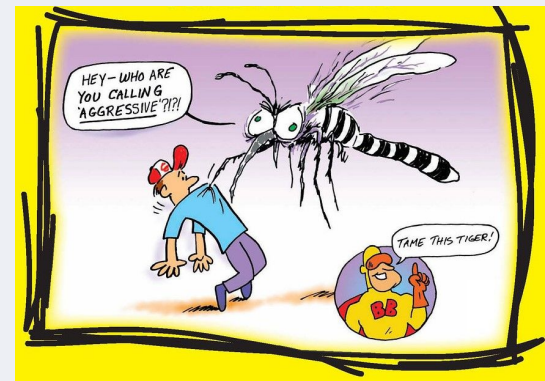


Image: Fairfax County Government (flickr)  
hiveminer.com/Tags/bite%2Cgovernment

*So, you want to learn about mosquitoes??*

# Why is this Important?

- Respect ecological niche of all living organisms
- Dispel fear....
- Understand risks/benefits of mosquito control and dangers of using non-selective pesticides indiscriminately
- Avoid false sense of security with pesticide usage
- Protect native pollinators and beneficial insects
- Learn personal protection tactics
- For a Good Quality of Life: Enjoy the outdoors!

# So, What Good Are Mosquitoes?

A lotta good!



Ary Farajollahi, Bugwood.org

- ← • They're **pollinators** (esp. males)
- They **aggravate caribou** herds in the tundra to move elsewhere so plants can thrive in their stead.

## They're food:

- Birds, bats, fishes, frogs, lizards, spiders eat adult mosquitoes
- Turtles, other amphibians, and dragonfly larvae eat mosquito eggs and larvae.

And more!

- **Mosquito larvae eat** algae, parasites, fungi, and other detritus
- **Larvae poop** in the water is great for plants!

From: [Britannica.com](http://Britannica.com) and [EndMosquitoes.com](http://EndMosquitoes.com).

# Mosquito Facts

- **Worldwide:** about 3,500 species
- **Virginia:** about 60 different species; variety of habitats.
- Largely aquatic--most development is in or near stagnant water.
- Only adult females feed on (“bite”) humans and other vertebrates for protein needed for eggs.
- Cold-blooded; do not generally bite if below 50° F.
- Can live 2-3 months; hibernating adults can live 6-8 months.



*Culex pipiens*

Ary Farajollahi, Bugwood.org



*Aedes albopictus*

Susan Ellis, Bugwood.org.



*Aedes aegypti*

(CDC Public Health Image Library)

# House (*Culex*) Mosquitoes

## *Culex pipiens* and *Culex restuans*



Ary Farajollahi, Bugwood.org

Adult *Culex pipiens* and *restuans* mosquitoes are nearly indistinguishable as adults. Both are small and brown; bite during dusk and dawn.

Prefer birds but will bite people and other mammals. Range is ½ to 2 miles.

Not as aggressive as other mosquitoes, (you may not notice one biting you). A good reason to wear insect repellent!

**Culex mosquitoes lay eggs in stagnant water (e.g., storm drains, clogged rain gutters, and sites with standing water).**

**These mosquitoes may spread West Nile virus and St. Louis Encephalitis.**

From: alexandriava.gov/MosquitoControl

# Yellow Fever Mosquito

*Aedes aegypti*



CDC Public Health Image Library)

*Aedes aegypti* mosquito prefer to bite people; primary transmitter of dengue, chikungunya, and Zika viruses; may also transmit West Nile and other viruses.

# Asian Tiger Mosquito

*Aedes albopictus*



Susan Ellis, Bugwood.org.

*Aedes albopictus* are slightly smaller, less likely to transmit disease than *A. aegypti* because they feed on both animals and people.

<https://www.cdc.gov/mosquitoes/mosquito-control/professionals/range.html>



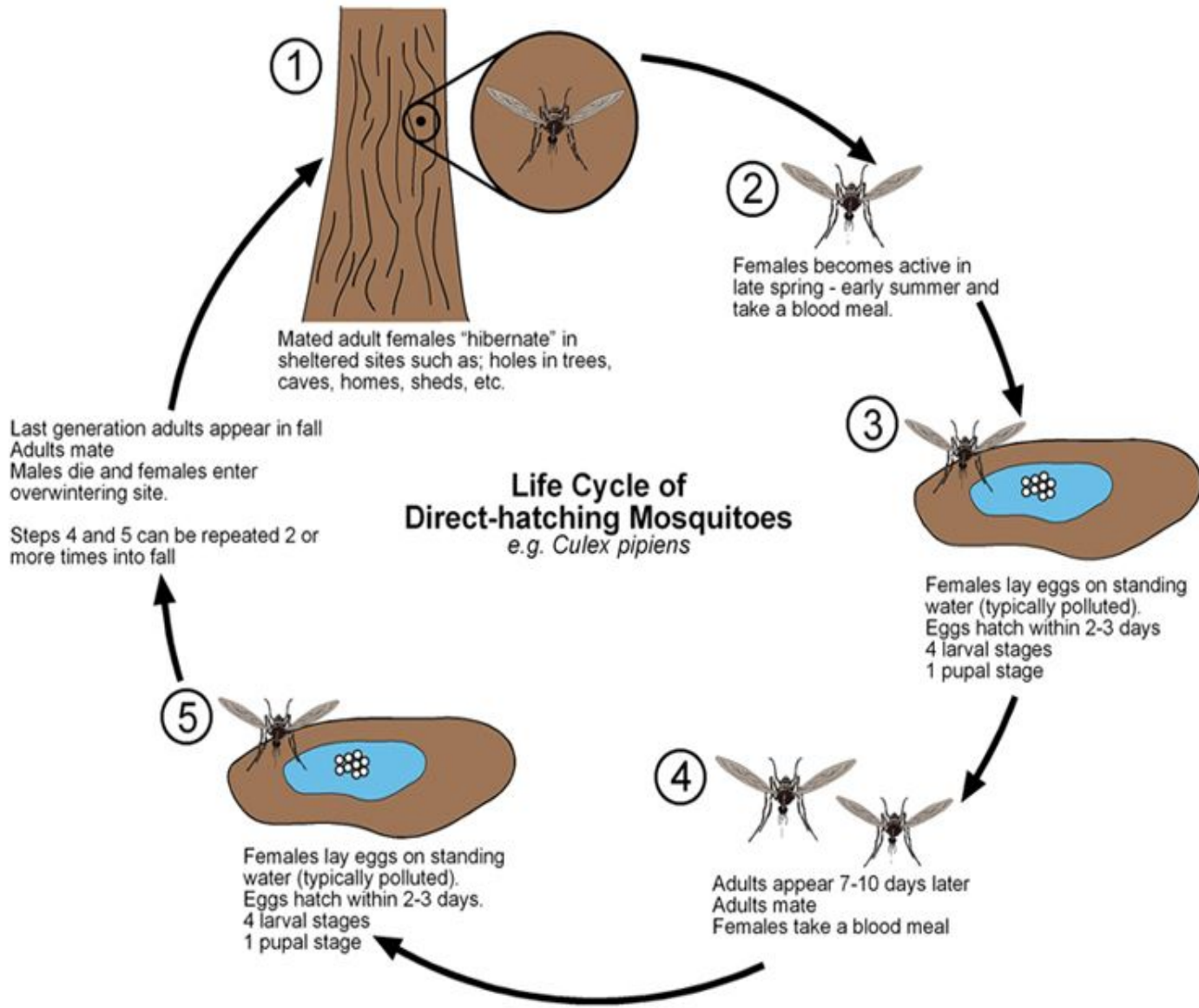
# Facts About Aedes Mosquitoes

- Fly and bite only during daylight hours
- Breed in:
  - small and large man-made containers
  - tree holes
  - natural rock pools
- Travel up to 600 feet

<https://www.cdph.ca.gov/Programs/CID/DCDC/pages/Aedes-aegypti-and-Aedes-albopictus-mosquitoes.aspx>

and

<https://www.cdc.gov/mosquitoes/about/life-cycles/aedes.html>



Egg raft from Kansas State Entomology, Kansas State University



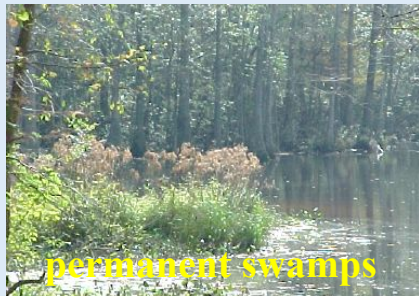
Larvae of *Culex* mosquitoes (Image: James Gathany, CDC)



Mosquito pupa by ProjectManhattan  
Creative Commons Attribution-Share Alike 3.0 Unported license

Diagram from Purdue Extension, Entomology, Purdue University

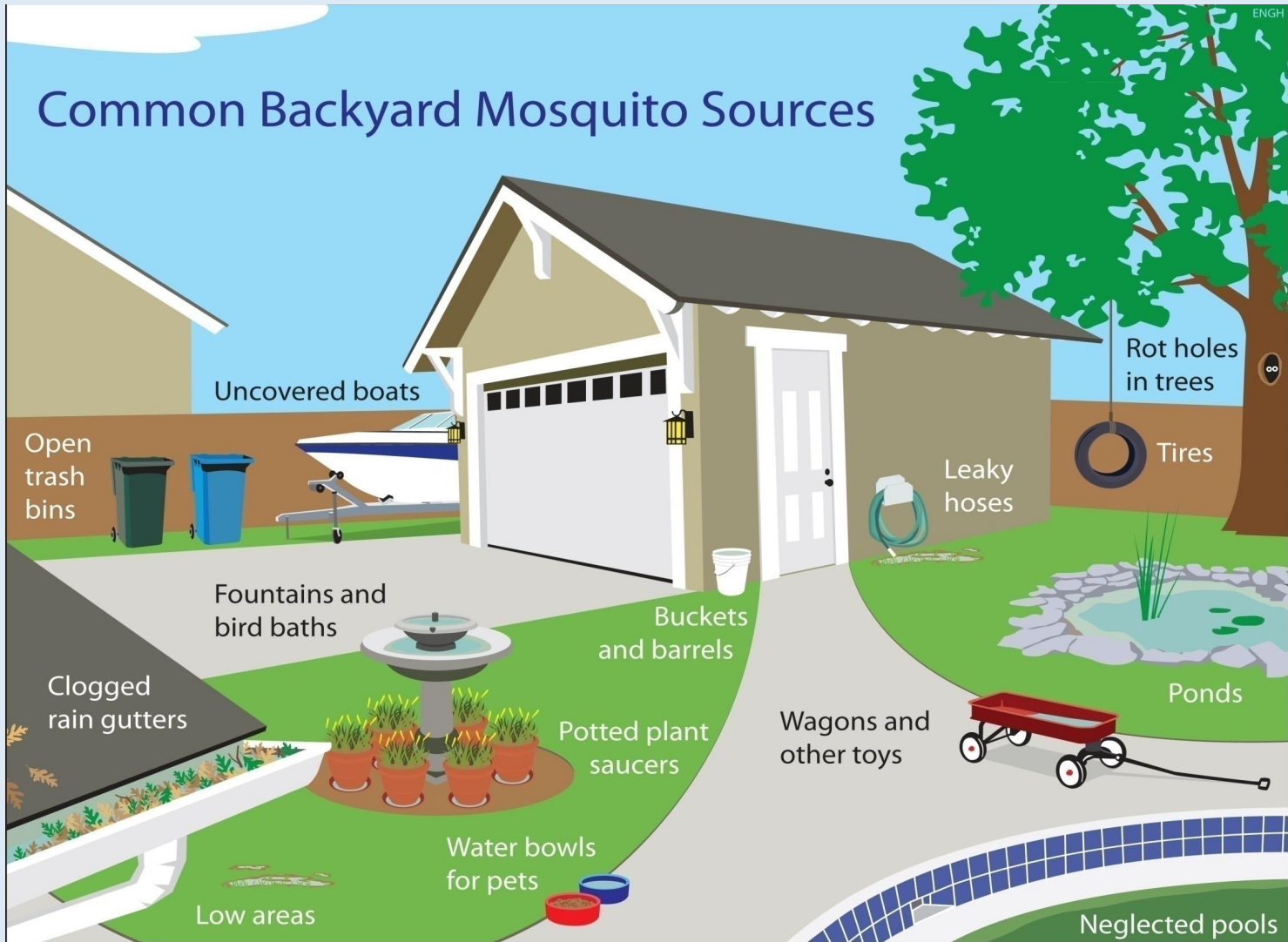
# Culex Mosquito Breeding Habitats



- Temporary bodies of water
- Seasonal/occasional
- Fresh or polluted
- Natural or manmade
- Lacking in predators

From: Virginia Department of Health presentation by Dr. David N. Gaines, Public Health Entomologist, VDHDH--Office of Epidemiology [vdh.virginia.gov/content/uploads/sites/12/2016/02/Mosq\\_biol\\_surv\\_cntrl\\_1.pdf](http://vdh.virginia.gov/content/uploads/sites/12/2016/02/Mosq_biol_surv_cntrl_1.pdf)

# Common Backyard Mosquito Sources



Texas A&M AgriLife Extension Service graphic  
[entomology.tamu.edu/2016/04/21/agrilife-extension-experts-inform-texans-on-protecting-from-zika-other-mosquito-borne-diseases/mosquitosourcesyard/c](http://entomology.tamu.edu/2016/04/21/agrilife-extension-experts-inform-texans-on-protecting-from-zika-other-mosquito-borne-diseases/mosquitosourcesyard/c)

# Where urban mosquitoes breed



**Artificial  
Containers**

Images courtesy of the Fairfax County Health Department. EXCEPT: Gutter photo credit: <http://801website.com/nicaliber/home-inspection/clogged-rain-gutters-in-saint-george/>; Ground drain photo credit: [qld.gov.au/health/conditions/all/prevention/mosquito-borne/control/controlling-breeding-sites#gallery-0-5](http://qld.gov.au/health/conditions/all/prevention/mosquito-borne/control/controlling-breeding-sites#gallery-0-5)

# QUESTIONS?

# Mosquito Controls

## Environmental and Cultural

- Remove sites where mosquitoes breed (still water) or change water every few days. **This is the most successful way to manage mosquito populations where you live.**
- Eliminate or reduce areas where mosquitoes rest (e.g., English ivy)
- Use screens to keep mosquitoes out

## Biological

- Predators
- Bti (e.g., Mosquito Dunks®)

## Chemical

- Oils
- Insecticides

**Most effective controls are directed at immature stages**

# Biological Larval Controls

**Fish (e.g., Mosquito fish (*Gambusia sp.*):**  
minnow-sized fish in shallow habitats  
such as backyard ponds/water  
features that larval mosquitoes prefer.  
**DO NO RELEASE TO THE WILD.**



**Western Mosquitofish**

by NYS Department of Environmental Conservation (CC BY-NC-ND 2.0)  
[flickr.com/search/?text=western%20mosquitofish](https://www.flickr.com/search/?text=western%20mosquitofish)

**Dragonfly larvae**

**Frogs/Toads**

**Water Striders and Ground Beetles**

**Biting Midge (*Corethrella*  
*appendiculata*)**

**Bti (*Bacillus thuringiensis* *Israeliensis*)**  
larvicide (Details on next slide)



UGA5255052

**Waterstriders.**

David Cappaert, Bugwood.org

# Biological Mosquito Larvicides

**Bti** (*Bacillus thuringiensis israelensis*) and **Vectolex** (*Bacillus sphaericus*) are only effective on early stage mosquito larvae, **NOT** pupae or adults!



Photo by Kasha Helget

## Mosquito Dunks®, bits, and granules

Apply to standing water; also, will bounce down through vegetation to aquatic habitat; kills within hours, lasts for 30 days or more.

**\*\*Highly selective for mosquito and certain fly species\*\***

# DIY Mosquito Traps

- Go on the offense -- Try this easy to assemble trap to reduce mosquito populations
  - Add straw or leaves and water to a bucket
  - Add half Mosquito Dunk
  - Optional – cover with chicken wire or a hydroponics lid to keep out critters
  - Place in your yard
- Monitor and replace water and Dunk as needed
- Continue to eliminate standing water
- Recruit neighbors to participate – mosquitoes don't respect property lines
- For more information -- <https://www.audubonva.org/news/how-to-set-up-a-mosquito-larva-trap>



# Self-Protection Clothing and Gear

Anti-mosquito clothing  
[allepress.com/l/32922729598.html](http://allepress.com/l/32922729598.html)



Clothing: Long sleeves, long pants, socks, shoes, hats, and neck covering.

Exclusionary products: Nets and screens for rooms, beds, clothing

Skin repellents: DEET: 25-30%, Picaridin: 20%, Oil of Eucalyptus, IR-3535 (Merck 3535) e.g., “Skin-So-Soft” prod



Long pants for mosquito protection  
Photo by Leslie Cameron

Mosquito bedding  
[nodecamer97imgbin.com/png/xkujce24/mosquito-nets-amp-insect-screens-insecticide-permethrin.png](http://nodecamer97imgbin.com/png/xkujce24/mosquito-nets-amp-insect-screens-insecticide-permethrin.png)



Photo by: Whitney Cranshaw, Colorado State University, Bugwood.org

# Adult mosquito control

Should be based on:

- Mosquito surveillance data
- Limited to distant, sheltered, or large breeding habitats
- **Used as a Last Resort!**



Spray Planes

USFS Northeastern Area, State & Private Forestry Archives, Bugwood.org

# Mosquito Adulticide Types and Cautions

**Pyrethroids** – Some have low toxicity to mammals and birds, but are toxic to fish, aquatic arthropods, and non-target insects.

- **Permethrin**
- **Resmethrin** (Scourge)
- **Sumithrin** (Anvil)

**Organophosphates** – Low to highly toxic to mammals, birds and fish, and **very highly toxic** to honeybees.

- **Malathion:** Low to moderate toxicity to mammals
- **Naled** (Dibrom): Moderate to high toxicity to mammals

**These highly lethal pesticides are also known as “Broad Spectrum or “non-selective.”**

# Hiring a pesticide applicator

- Use only a **VDACS licensed** pest management company
- Ask for an IPM (integrated pest management) plan which should not include adulticides alone, and staff training in IPM mosquito control.
- Compare several proposals for service. Look for reputation for quality of service over price.
- VA law requires **Pesticide Discharges General Permit (VAG87)** for application over water.

Contact the **Virginia Department of Agriculture and Consumer Services (VDACS) Office of Pesticide Services**, at **804.371.6560** for concerns about pesticide misuse.

**This office takes reports of pesticide application misuse very seriously.**

# Pollinator Protection and Pesticides

## When working with pesticide applicators

### Do NOT apply :

- When pollinators are active
- On food crops
- On flowering plants that pollinators visit.
- On windy days, in the hottest part of the day, or before rain.

### Instead of Spraying:

- Remove or cut mosquito-friendly plants (dense ground cover like Eng. ivy)
- Encourage natural predators (birds, other insects that eat mosquitoes)
- Remove standing water or use selective biological larvicides.
- Use fans to move the air (mosquitoes are weak flyers)

**ONLY as last resort**, use “ultra low volume” sprays during cool parts of the day and when pollinators are not active to reduce drift.

# Mosquito controls that DO NOT WORK:



- Bug Zappers
- Spraying Listerine, wearing dryer sheets, VapoRub, vanilla, etc.
- Wristbands, ultrasonic devices, clip-on repellents
- Citronella and other plants
- Propane-driven CO2 mosquito traps
- Bats and Purple Martins do not prefer mosquitoes.
- It doesn't matter what you eat. Garlic doesn't keep them away.



All images from: clipart.email/

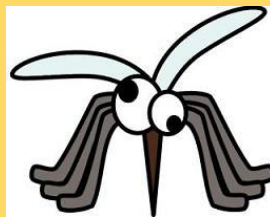


# Remember!

- The average range of an adult mosquito is between 600 ft. and 1-2 miles. Work with neighbors to remove breeding and sheltering sites.
- The most popular spray chemical, **Permethrin, is non-selective** (it kills beneficial insects, too).
- Permethrin can remain in the environment for some period of time, increasing exposure to beneficial insects.
- Mosquitoes do not like to breed in moving water. Use a bubbler if you can't change water every few days.

# How to Avoid Adult Mosquitoes

- **Ensure door, window, and rain barrel screens are intact.**
- **Avoid being outside during dawn and dusk, AND/OR**
- **Wear long sleeves & pants when outdoors, AND/OR**
- **Use an effective repellent on exposed skin**
  - DEET, Picaridin, IR-3535, or Oil of Lemon Eucalyptus.
  - Follow label directions!
- **Mosquitoes are weak fliers. Use fans to move air around outdoor social areas.**



[clker.com/clipart-mozzy.html](http://clker.com/clipart-mozzy.html)  
(Pub. domain)

# QUESTIONS?

# Ticks of Virginia

- Identify the most common ticks
- Know how to **Avoid**, **Repel**, and **Remove** them
- Recognize signs of tick-borne diseases
- Care for your pets and your yards



# What Good Are Ticks?



Public Domain

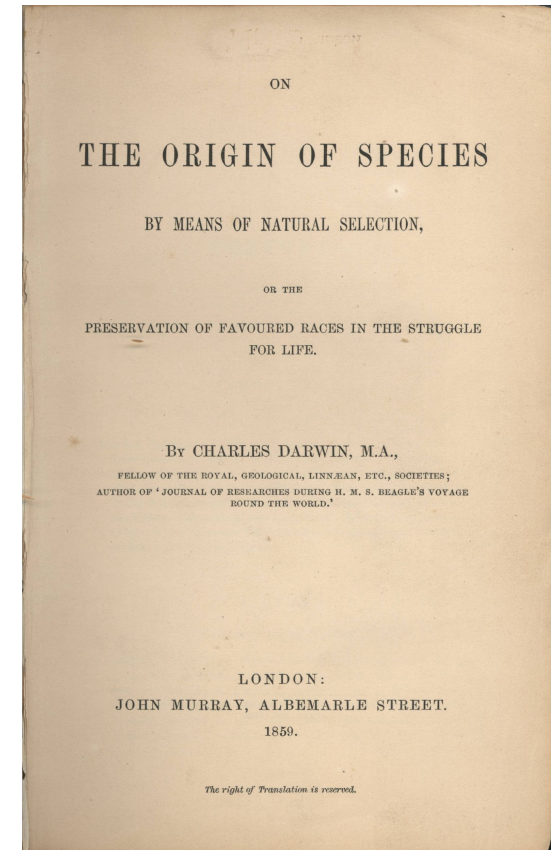
They're **food** for:

- Reptiles, birds, and small mammals, and
- Parasites (e.g., nematodes, tick wasp)

They have a big role in **Evolution**, too

- Animals weakened by vector-borne disease may die or have fewer offspring.
- Others stay healthy and pass better genetic traits to their offspring.

*Survival of the Fittest*



Public Domain

# Tick ID

## Need to look at:

- Tick size
- Ornamentation
- Mouth parts
- Festoons

## Essentials:

- magnifying glass
- ruler
- comparison pictures

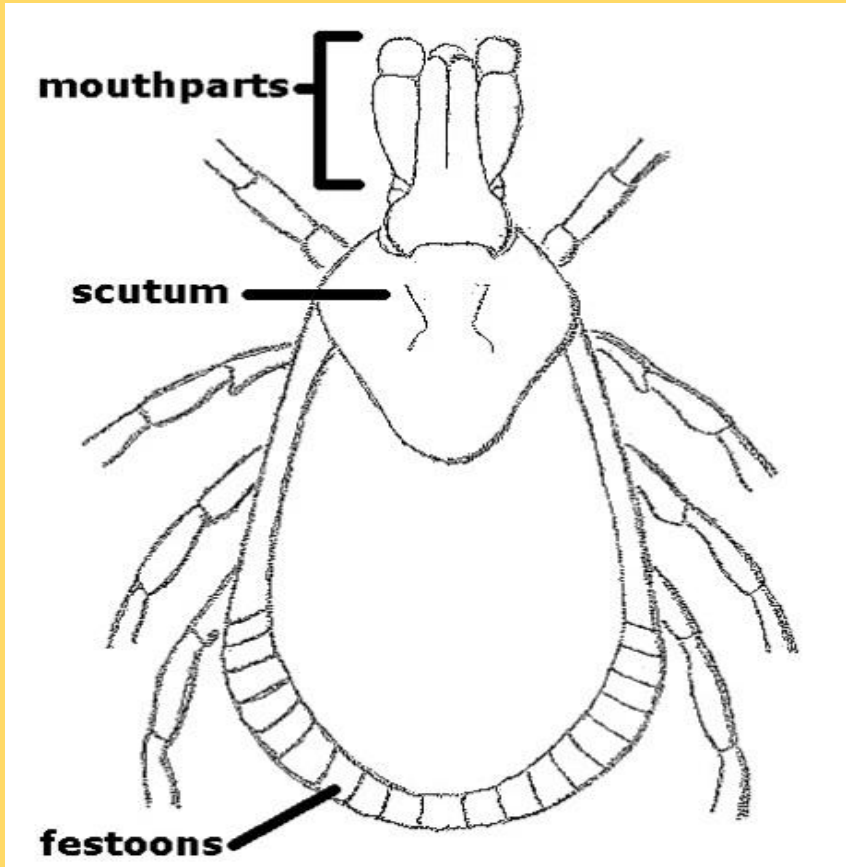


Image: Illinois Dept. of Public Health  
[dph.illinois.gov/topics-services/environmental-health-protection/structural-pest-control/com  
mon-ticks/identification](http://dph.illinois.gov/topics-services/environmental-health-protection/structural-pest-control/common-ticks/identification)

# Size Comparison of Ticks

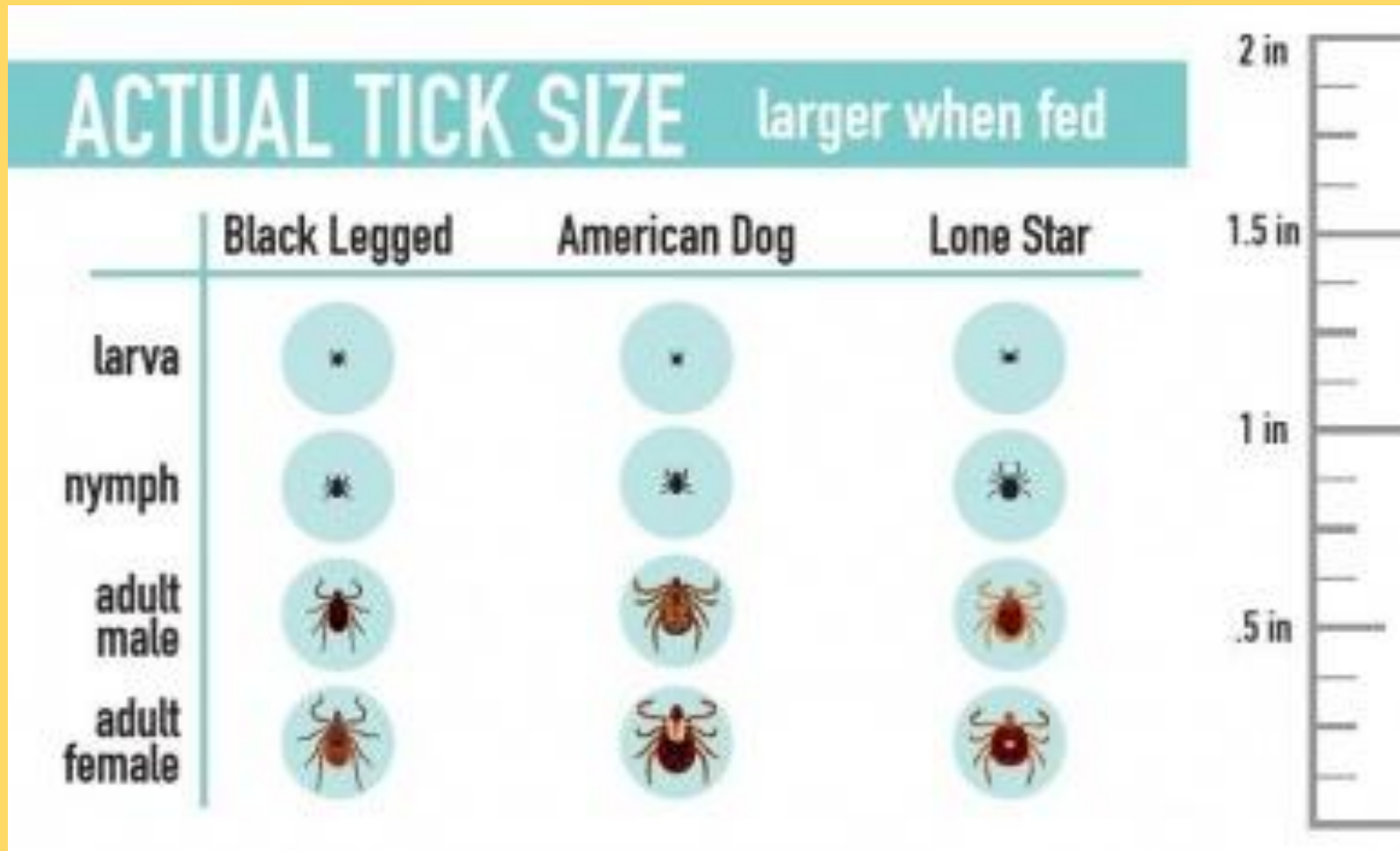
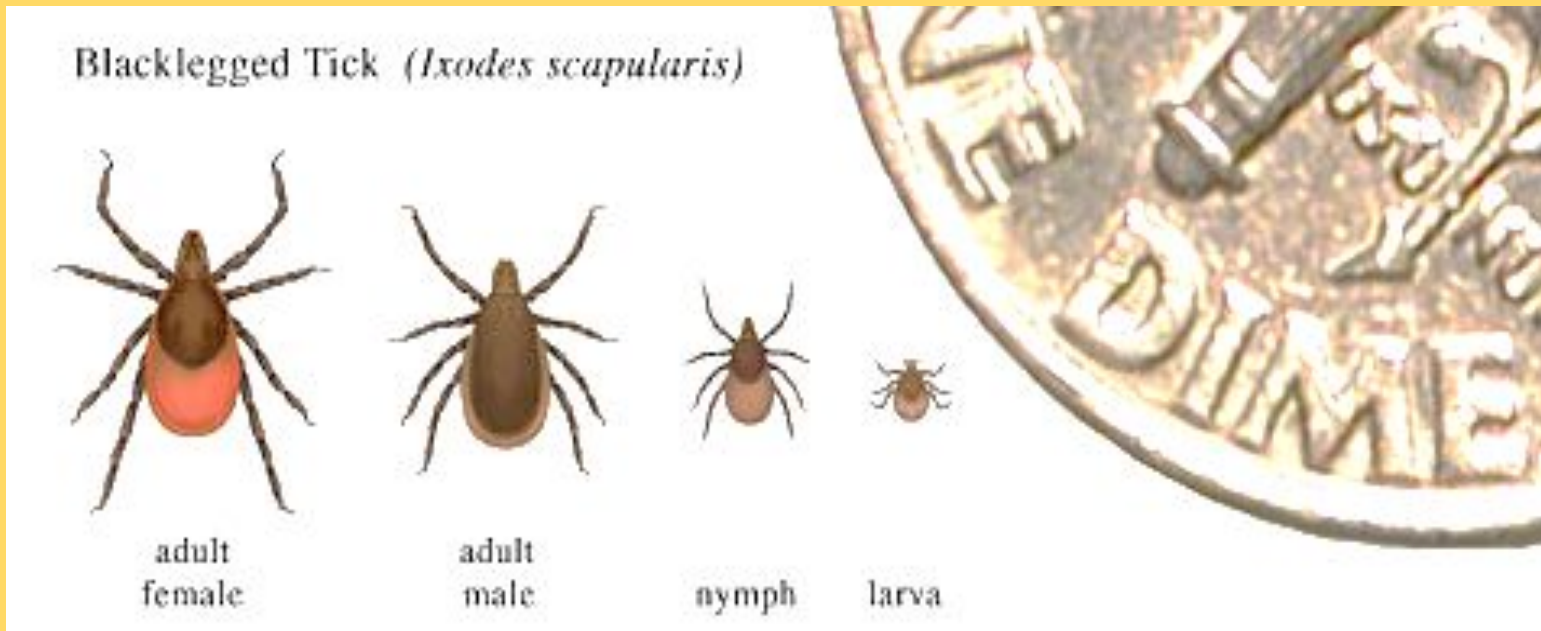
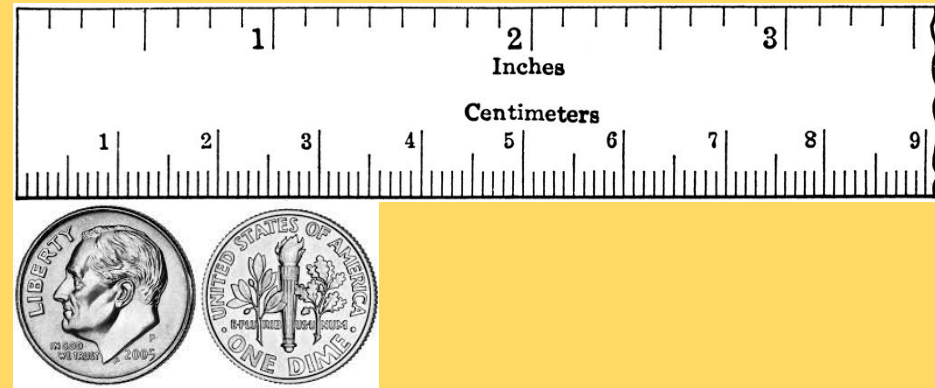


Image: Cornell College of Agriculture and Life Sciences

[nysipm.cornell.edu/whats-bugging-you/ticks/what-do-ticks-look/](https://nysipm.cornell.edu/whats-bugging-you/ticks/what-do-ticks-look/)

In general, adult ticks may be about the size of a sesame seed, nymphs--the size of a poppy seed, and larva--the size of pepper.



From CDC.gov

[cdc.gov/lyme/transmission/blacklegged.html](https://cdc.gov/lyme/transmission/blacklegged.html)

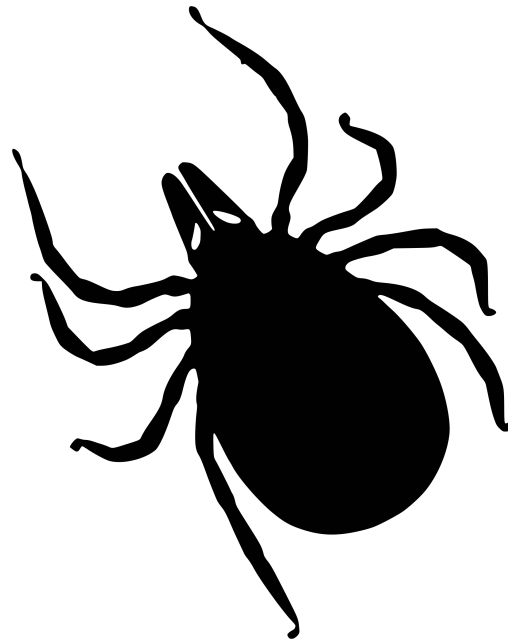
# Most Common Ticks of N. Virginia

## Long-term

American Dog Tick  
Lone Star Tick  
Brown Dog Tick  
Blacklegged (Deer)  
Tick

## Newcomers

Asian Longhorned  
Tick  
Gulf Coast Tick



**Many of these  
ticks are active  
March through  
September.**

**Some adult  
ticks remain  
active in winter**



American Dog tick larva, nymph, adult male, adult female  
University of Rhode Island Tick Encounter Center [tickencounter.org/tick\\_identification/dog\\_tick](http://tickencounter.org/tick_identification/dog_tick)

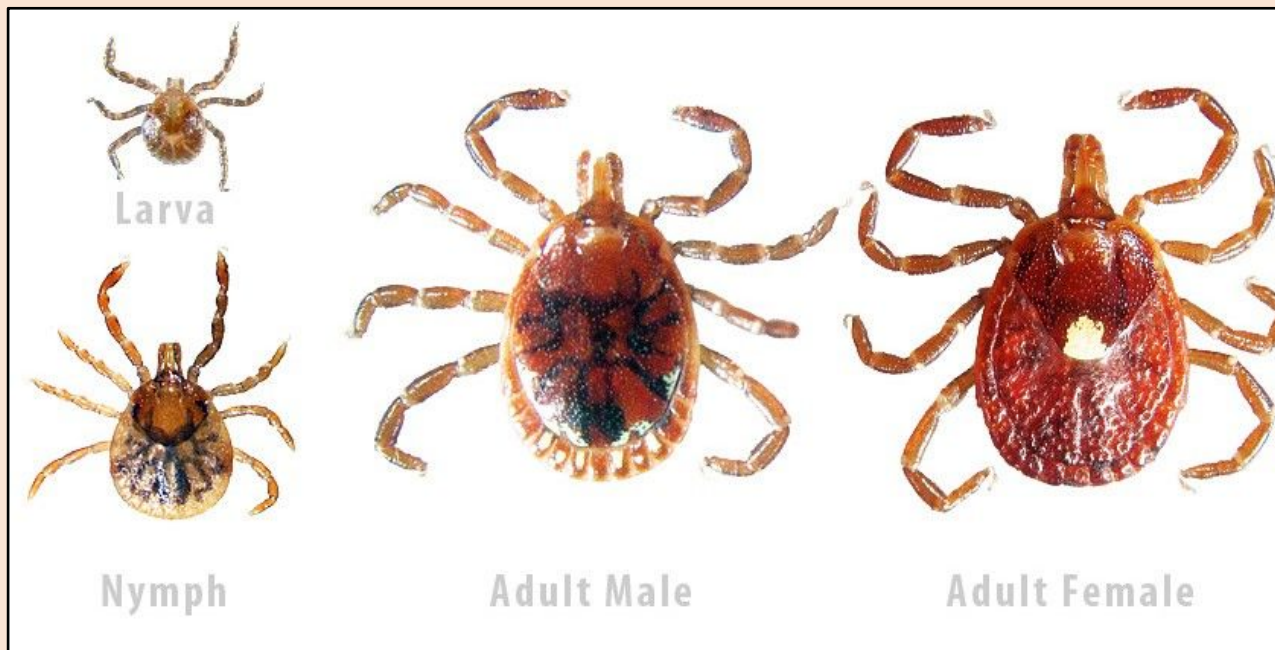
## American Dog Tick

*Dermacentor variabilis*

Adults have short stout mouthparts with festoons.

Female: about 5 mm long with prominent scutum, dark brown with light wavy lines on its back.

Male: slightly smaller w/sugary coloration.



Lone Star Tick nymph, larva, adult male, adult female

University of Rhode Island Tick Encounter Center [tickencounter.org/tick\\_identification/lone\\_star\\_tick](http://tickencounter.org/tick_identification/lone_star_tick)

## Lone Star Tick

*Amblyomma americanum*

Adults: Reddish brown with festoons; up to 5 mm long with long mouthparts.

Female have a central white spot on the back.

Males have spots or streaks of white pigment around outer edge of the body.



Brown Dog Tick larva, nymph, adult male, adult female

University of Rhode Island Tick Encounter Center [tickencounter.org/tick\\_identification/brown\\_dog\\_tick](http://tickencounter.org/tick_identification/brown_dog_tick)

## Brown (Brown Dog) Tick

*Rhipicephalus sanguineus*

Adults about 5 mm long with short stout mouthparts and festoons.

Females: dark reddish-brown color and lack of white markings

Males: tiny “pins” scattered on back.



Asian Longhorned Tick adult female (left), nymph (center), and larva (right).

Photo credit: Manigandan Lejeune, Animal Health Diagnostic Center

## Asian Longhorned Tick

*Haemaphysalis longicornis*

Adults about 3-5 mm. long, nondescript reddish-brown color, with festoons but without any distinctive markings. Mouth parts are both short and wide.

May remain active in winter.



Gulf Coast Tick larva, nymph, adult male and adult female

University of Rhode Island Tick Encounter Center [tickencounter.org/tick\\_identification/gulf\\_coast\\_tick](http://tickencounter.org/tick_identification/gulf_coast_tick)

## Gulf Coast Tick

*Amblyomma maculatum*

Adults are 5 to 6 mm long with long, narrow mouthparts and festoons.

Females have a dark brown scutum with stripes.

Males have ornately patterned upper body.



Deer Tick larva, nymph, adult male and adult female

University of Rhode Island Tick Encounter Center [tickencounter.org/tickidentification/deertick](http://tickencounter.org/tickidentification/deertick)

## Blacklegged (Deer) Tick

*Ixodes scapularis*

Adults have NO festoons.

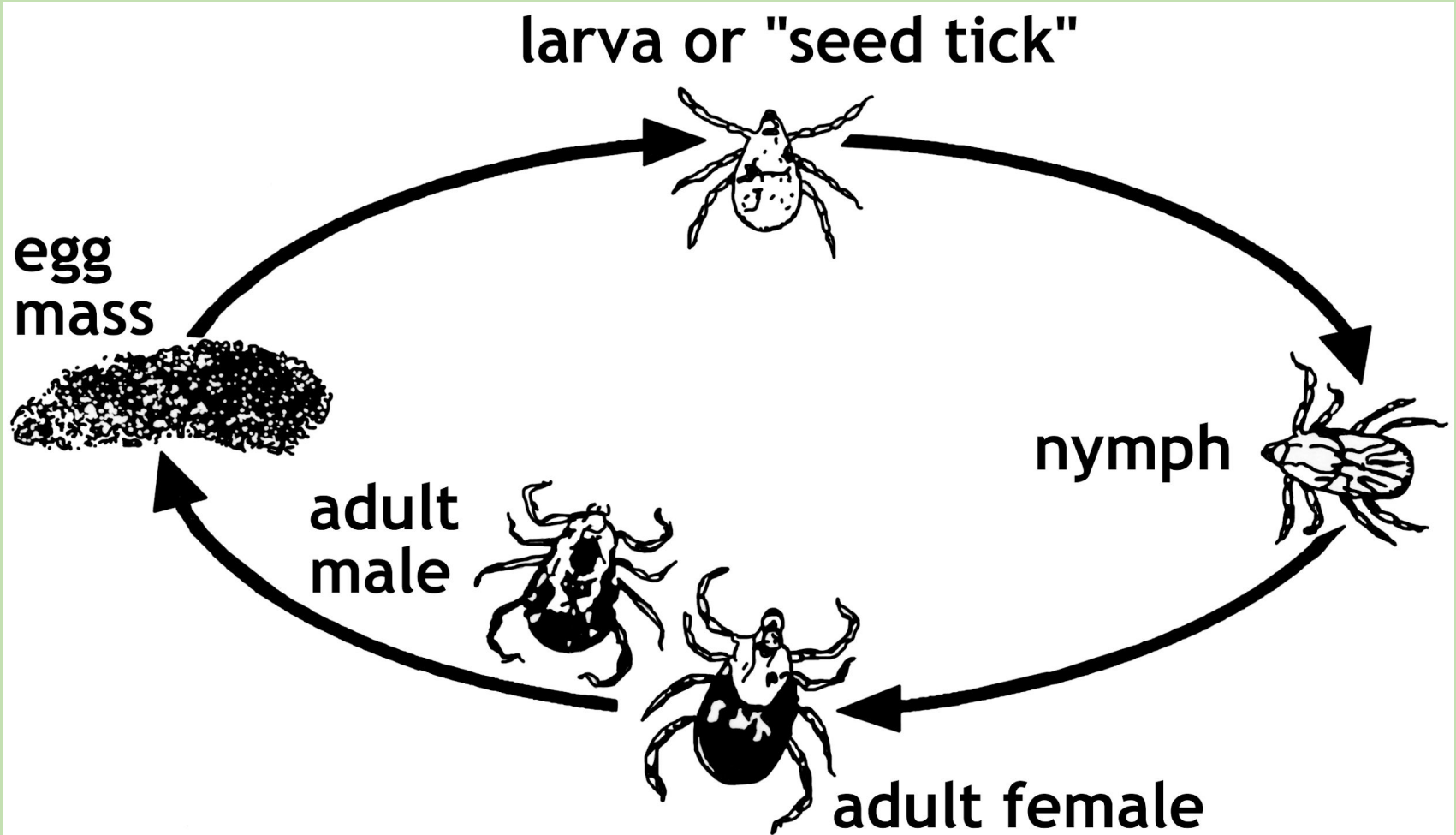
Females are 2 to 3 mm long with long mouthparts. It is reddish or off-white when fed and has black legs.

Males are slightly smaller, with smaller mouthparts, dark brown with no reddish coloring

May remain active in winter.

# TICK LIFE CYCLE

ID of life stages



University of Georgia Extension  
[extension.uga.edu/publications/detail.html?number=C937&title=Protect%20Yourself%20from%20Ticks](http://extension.uga.edu/publications/detail.html?number=C937&title=Protect%20Yourself%20from%20Ticks)

# Blacklegged Tick Life Cycle

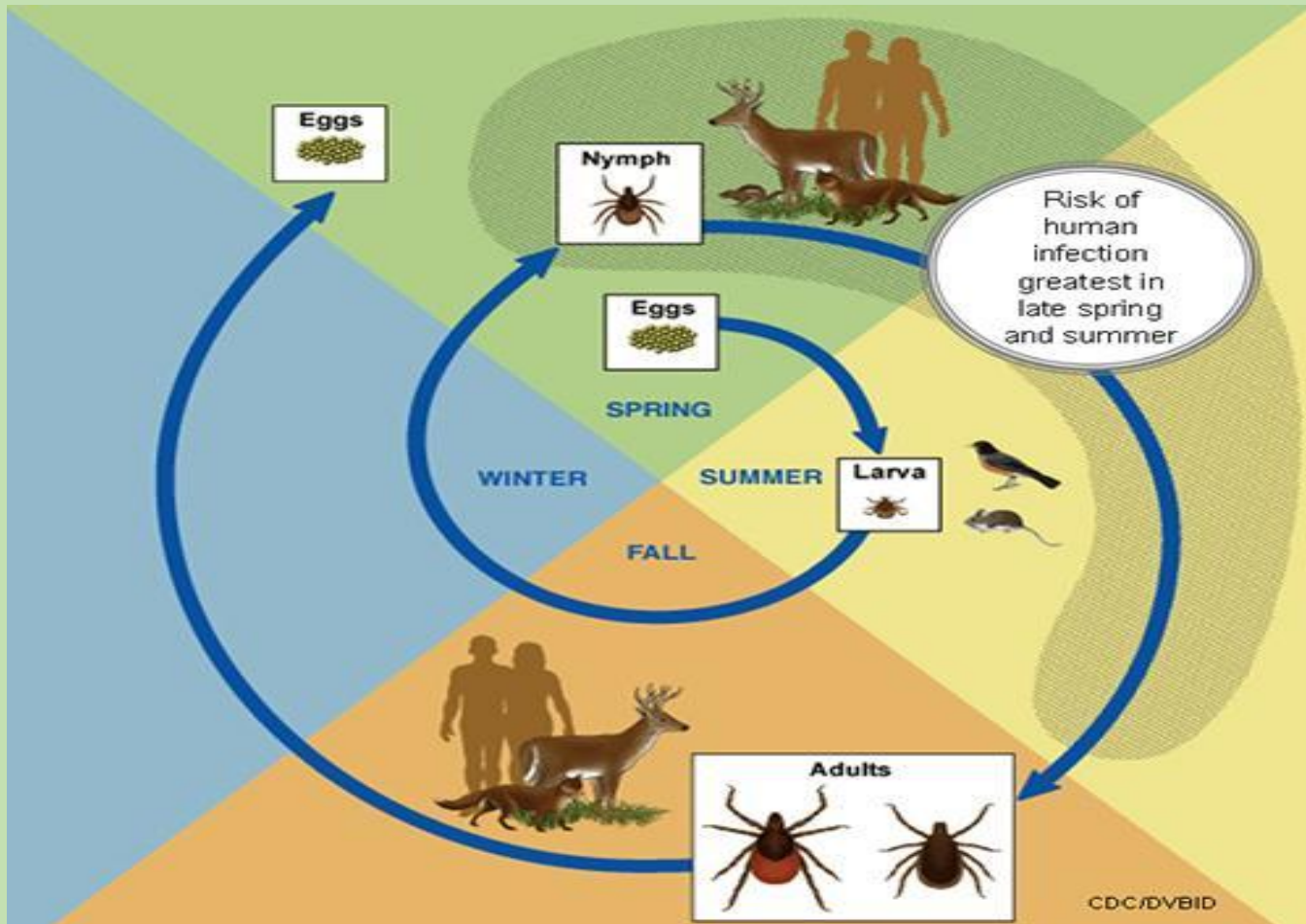


Image courtesy of CDC: [cdc.gov/lyme/transmission/blacklegged.html](http://cdc.gov/lyme/transmission/blacklegged.html)

Every life cycle stage needs a blood meal. Slow feeders! = 3-5 days

## Times of Year When Tick Stages in Virginia are Active



\*Only the adult life stage of the American Dog Tick is known to bite humans.

\*\*Seasonality data across all life stages for the Asian Longhorned Tick is currently incomplete.



Female American Dog Tick  
“questing” on the end of a leaf  
blade

# How Ticks Feed and Spread Disease

- Ticks transmit pathogens that cause disease through the process of feeding.
- It can take minutes or hours for a tick to attach to its host and days to feed. Check frequently to prevent attachment.
- Ticks can ingest pathogens from a host and can spread those pathogens to the next host.  
**Not every tick carries disease so not every attachment transmits disease.**

From: Centers for Disease Control and Prevention.

# QUESTIONS?

# What to Do? Avoid

**Ticks are most active in VA March – Sept.  
May, June, July is time of most disease  
transmission**

- Keep grass and underbrush cut and thinned in your yard.
- Walk in center of trail or walkway; don't brush against weeds, shrubs, dense vegetation, or tall grass where ticks wait to crawl onto animals or people.
- Wear light colored clothing (better to see ticks).
- Tuck pants into socks so ticks stay on the outside of pants.
- Check kids and pets for ticks every 4 hours—and yourself, too!
- **Put clothes in hot dryer to kill any ticks.**

# What to Do? **Repel**

Wear repellent that contains either:

- DEET 25- 30%
- Picaridin- 20%
- Oil of Eucalyptus
- IR-3535 (Merck 3535)
- New one approved by EPA: w/Nootkatone ingredient

Treat clothes, boots, and shoes with permethrin (follow all label precautions) or purchase pre-treated clothes

Ask your veterinarian for tick controls for your pets



# DEET Advice

**Reports of DEET toxicity are rare but....**

- apply sparingly to exposed skin or clothing
- Use concentrations of 30% or less
- should not use on infants
- Do not apply on palms of hands or near eyes, mouth, cuts and wounds
- Wash off immediately after returning indoors

# Permanone™ (Permethrin)

- For Clothes and shoes ONLY – NOT intended for skin
- Kills rather than repels
- Sprayed clothes should dry two hours before wearing
- Lasts about 2 weeks, including through laundering
- Poorly absorbed, rapidly inactivated



Image:  
[repel.com/products/personal-repellents/clothing-gear/clothing-gear.aspx](http://repel.com/products/personal-repellents/clothing-gear/clothing-gear.aspx)

**Read Instructions!**



Image:  
[sawyer.com/products/permethrin-insect-repellent-treatment/](http://sawyer.com/products/permethrin-insect-repellent-treatment/)

# Landscape Treatment for Ticks

Sprays have limited effectiveness & are non-selective

Remove or isolate brush, provide air circulation to reduce humidity (which ticks prefer), keep lawns mowed, clean up leaves

Install mulch barrier between lawns & wooded areas, & near patios & play equipment

Exclude wild animal (e.g., deer fences)

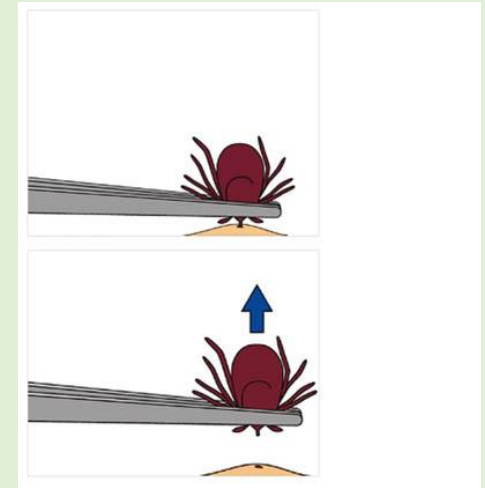


Image:

[patch.com/wisconsin/whitefishbay/school-district-will-talk-about-adopting-uniform-pest9c3669b025](https://patch.com/wisconsin/whitefishbay/school-district-will-talk-about-adopting-uniform-pest9c3669b025)

# Got Ticks?

- First, search head-to-toe at least daily when in vegetated areas; ask someone else to search scalp and back.
- Tick found: With tweezers, grasp the tick mouth parts close to the skin and gently pull in a steady upward motion.
- Try not to touch it with bare hands.
- Don't crush the tick or use alcohol or fire on the tick.
- Best if remove tick within 24 hours.



Center for Disease Control and Prevention:  
[www.cdc.gov/ticks/removing\\_a\\_tick.html](http://www.cdc.gov/ticks/removing_a_tick.html)



University of Maine Cooperative Extension:  
[extension.umaine.edu/ticks/removal/](http://extension.umaine.edu/ticks/removal/)

# Then What?

- (1) After removing the tick, **thoroughly clean the bite area** and your hands with rubbing alcohol, an iodine scrub, or soap and water.
- (2) Either: submerge live tick in alcohol, place it in a sealed bag or container, wrap it tightly in tape, or flush down toilet. **Don't crush with your fingers.**
- (3) **To ID:** Use a Tick ID app or take to VCE office (address on last slide). Place tick in zip lock bag with rubbing alcohol to cover, and provide contact info, date and location where tick attached, and approx. length of attachment.
- (4) **If you develop a rash or fever or other unusual symptoms** within several weeks of removing a tick, **see your doctor.** Tell the doctor when and where you most likely acquired the tick.



Memorial Animal Hospital, Kent, Ohio:  
[memorialanimalhospital.com/post/nine-things-to-know-about-five-ticks-in-ohio](http://memorialanimalhospital.com/post/nine-things-to-know-about-five-ticks-in-ohio)

# Basic Information about Tick-Borne Diseases

- Tick-borne diseases are the most common vector-borne illnesses in the United States.
- Wherever ticks are found
- Tick populations are greatest in the northeast (esp. NJ, NY, CT, MA and PA), upper Midwest (WI and MN), and northern Pacific states (CA and OR)



Lone Star Tick  
Center for Diseases and Prevention  
[cdc.gov/ticks/tickbornediseases/tickID.html](https://www.cdc.gov/ticks/tickbornediseases/tickID.html)

## Chart of Tick Species and Tick-borne Diseases

| Illness or Condition                          | Vector Tick Species | Tick Stage(s) Transmitting Disease | Minimum Feeding Time for Disease Transmission |
|---|---------------------|------------------------------------|---|
| Acquired Red Meat Allergy                     | Lone Star Tick      | Larva, Nymph, Adult                | Unknown                                       |
| Anaplasmosis                                  | Blacklegged Tick    | Nymph, Adult                       | 24 Hours                                      |
| Babesiosis                                    | Blacklegged Tick    | Nymph, Adult                       | 36 hours                                      |
| <i>Borrelia miyamotoi</i> Disease             | Blacklegged Tick    | Larva, Nymph, Adult                | 24 Hours                                      |
| Ehrlichiosis                                  | Lone Star Tick      | Nymph, Adult                       | 24 Hours                                      |
| Heartland Virus                               | Lone Star Tick      | Nymph, Adult                       | Unknown                                       |
| Lyme Disease                                  | Blacklegged Tick    | Nymph, Adult                       | 36 Hours                                      |
| Powassan Virus                                | Blacklegged Tick    | Nymph, Adult                       | 15 minutes                                    |
| <i>Rickettsia parkeri</i> Disease             | Gulf Coast Tick     | Adult                              | Unknown                                       |
|   | Lone Star Tick      | Larva, Nymph, Adult                |   |
| Rocky Mountain Spotted Fever                  | American Dog Tick   | Adult                              | 2-20 hours                                    |
|   | Brown Dog Tick      | Nymph, Adult                       |   |
|   | Lone Star Tick      | Larva, Nymph, Adult                |   |
| Southern Tick Associated Rash Illness (STARI) | Lone Star Tick      | Nymph, Adult, ?                    | Unknown                                       |
| Tularemia                                     | American Dog Tick   | Adult                              | Unknown                                       |
|   | Lone Star Tick      | Nymph, Adult                       |   |

From VA Health Dept. website: <https://www.vdh.virginia.gov/content/uploads/sites/12/2019/08/Tick-borne-Disease-in-Virginia-Flyer-8.5-x-11-format-for-website-.pdf>

# Lyme Disease

(*Borrelia burgdorferi*-spirochete)

- Appears in 48/50 States (We have a mobile society!)
- Transmitted by *Ixodes sp.* Initially an oblong rash, about 2 or more inches in size, with a clear center at the site of the tick bite, 70% of people develop this symptom.
- Transmission may occur with tick attachment of 24+ hrs. but may take less time. Important to check for ticks frequently! \*
- Later: flu-like symptoms (nausea, headache, fever, and general stiffness of the neck joints).
- Chronic symptoms of a small percentage of untreated people include arthritis and nervous system complications.

\* See e.g.: [LymeDisease.org](http://LymeDisease.org)

**GRAPHIC Photos of Lyme Disease Rash on Next Slide**

# Lyme Disease

## (*erythema migrans* rash)

Classic but not dependable rashes associated with Lyme Disease



Image 1



Image 2

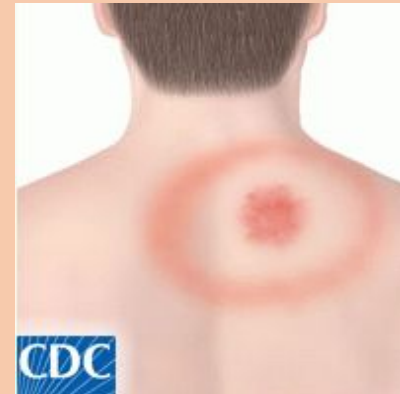


Image 3



Image 4

Image 1: Center for Disease Control and Prevention  
[cdc.gov/lyme/signs\\_symptoms/rashes.html](http://cdc.gov/lyme/signs_symptoms/rashes.html)

Image 2: Fairfax County Department of Environmental Health  
[fairfaxcounty.gov/health/fightthebite/tick-diseases](http://fairfaxcounty.gov/health/fightthebite/tick-diseases)

Image 3: Mississippi State Department of Health  
[msdh.state.ms.us/msdhsite/\\_static/14.339.227.html](http://msdh.state.ms.us/msdhsite/_static/14.339.227.html)

Image 4: University of Maine Cooperative Extension  
[extension.umaine.edu/ticks/tick-borne-diseases/](http://extension.umaine.edu/ticks/tick-borne-diseases/)

# Rocky Mountain Spotted Fever

(*Rickettsia rickettsii*)

- RMSF requires tick attachment for 4-6 hours
- Day 2-12 after bite: first symptoms noticed are usually severe headache, chills, fever, muscle aches, nausea, vomiting, and other flu-like symptoms
- Day 3+: a red rash on wrists and ankles in most cases, and often spreads to the entire hand or foot. A blood test is needed to confirm the disease, and early use of antibiotics has a very high rate of cure.

**GRAPHIC photos of RMSF are on next slide**

# Rocky Mountain Spotted Fever Rash



Image 1: Early Stage RMSF Rash



Image 2: Late Stage RMSF Rash



Image 3: Later Stage RMSF Rash



Image 4: RMSF Rash

Image 1: Center for Disease Control and Prevention  
[cdc.gov/rmsf/healthcare-providers/signs-symptoms.html](https://www.cdc.gov/rmsf/healthcare-providers/signs-symptoms.html)

Image 2: Center for Disease Control and Prevention  
[cdc.gov/rmsf/symptoms/index.html](https://www.cdc.gov/rmsf/symptoms/index.html)

Image 3: Center for Disease Control and Prevention  
[cdc.gov/rmsf/healthcare-providers/signs-symptoms.html](https://www.cdc.gov/rmsf/healthcare-providers/signs-symptoms.html)

Image 4: Encyclopedia of Children's Health Forum Photograph by Ken E. Greer. Visuals Unlimited  
[healthofchildren.com/R/Rocky-Mountain-Spotted-Fever.html](https://www.healthofchildren.com/R/Rocky-Mountain-Spotted-Fever.html)



publicdomainvectors.org

There may be other types of, or no rashes. We are not doctors and cannot diagnose disease. If you feel lousy after possible exposure, see a doctor.

# Pets can get tick-borne diseases, too



- Check your pet for ticks after it has been outside.
- There are collars, sprays, powders, etc. to stop ticks from biting your pet.
- **Always** ask your veterinarian how to protect your pet from tick bites.
- Ticks can live on a pet's (and human's) bedding indoors. Look for ticks and when cleaning bedding, put in hot dryer for at least 20 minutes to kill them.

Image: TLC Pet Food  
[tlcpetfood.com/the-tlc-scoop/tick-talk-protecting-your-dog-from-ticks/](http://tlcpetfood.com/the-tlc-scoop/tick-talk-protecting-your-dog-from-ticks/)

# In Summary: How to Prevent Ticks

## People

- Avoid contact with grasses, leaves, & shrubs where ticks wait
- Use repellent; wear appropriate clothing
- Check for and remove ticks; use hot dryer for clothes

## Pets

- Use appropriate repellent (talk to veterinarian)
- Check pets thoroughly after being outside
- Check bedding (put in hot dryer if necessary)

## Yard

- Remove or isolate brush, clean up leaf litter
- Install mulch or hardscape barrier between wooded areas and lawns, patios, or play areas
- Discourage wildlife that may carry ticks

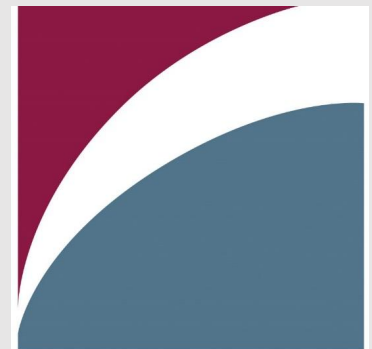
# Resources for Mosquito/Tick Info

For a copy of this PPT and more mosquito/tick info:

<https://armn.org/mosquitos-and-ticks/>

<https://mgnv.org/resources/mosquito-control/>

<https://mgnv.org/resources/tick-control/>



**Virginia  
Cooperative  
Extension**

Virginia Tech  
Virginia State University

# More Resources for Mosquito/Tick Info

- **Centers for Disease Control & Prevention** Vector Borne Diseases:
  - <https://www.cdc.gov/ncezid/dvbd/index.html>
- **Virginia Department of Health** Mosquito and Tick Disease Info
  - <http://www.vdh.virginia.gov/environmental-epidemiology/bugs-human-health/>
  - <https://www.vdh.virginia.gov/content/uploads/sites/12/2019/08/Tick-borne-Disease-in-Virginia-Flyer-8.5-x-11-format-for-website-.pdf> Good 4-pager with basic tick ID/disease info.
- **Virginia Cooperative Extension** Mosquitoes and Their Control
  - [https://www.pubs.ext.vt.edu/content/dam/pubs\\_ext\\_vt.edu/ENTO/ENTO-202/ENTO-470.pdf](https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt.edu/ENTO/ENTO-202/ENTO-470.pdf)
- **Virginia Department of Agriculture and Consumer Services**
  - <http://www.vdacs.virginia.gov/pesticides.shtml>



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# For ID help, contact the VCE Horticultural Help Desk



Fairlington Community Center, 3308 S. Stafford St., Arlington VA 22206

Hours: 9am to Noon, Weekdays

Email: [mgarlalex@gmail.com](mailto:mgarlalex@gmail.com); Phone: 703-228-6414

You may bring in a DEAD insect, preserved in alcohol for identification. For best results, CALL FIRST to ensure someone is present to identify it (703-228-6414) and bring it the same day as capture, if possible. Do not subject sample to extreme temperatures.

NOTE: Both the VCE and VA Tech's Insect ID labs can ONLY identify a tick and its development or life cycle stage. Neither is able to assess or test for pathogens.

For additional information on tick testing and labs that test for pathogens, here is a [Yahoo search](#) to get you started.