

Mosquito & Tick Management: Pesticide Reduction for Pollinator Protection

Summer 2020

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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/
- 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
- Search tip -- site:edu, site:gov



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

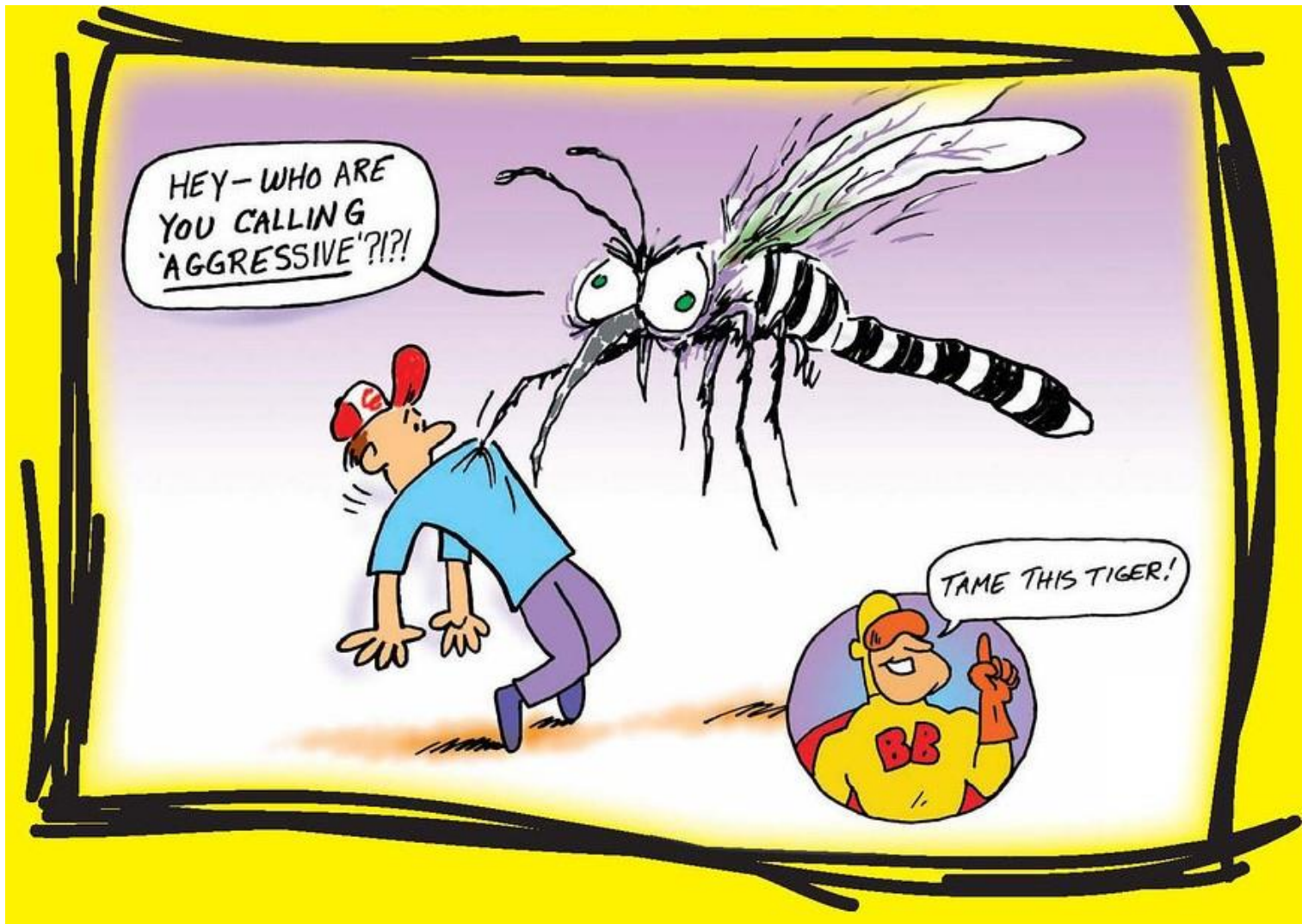


Photo by Toni Genberg



Photo by Karen Thomas

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



So, you want to learn about mosquitoes??

Why is this Important?

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

Mosquito Facts

- **Worldwide:** over 3,000 species
- **Virginia:** about 40 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

James M Newman, UF/IFAS/FMEL
floridahealth.gov/diseases-and-conditions/mosquito-borne-diseases/_documents/fl-resident-guide-to-mosquito-control-ifas.pdf

Culex Mosquitoes

Culex pipiens and *Culex restuans*



Ary Farajollahi, Bugwood.org

Culex mosquitoes 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, so 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.

From: alexandriava.gov/MosquitoControl

Asian Tiger Mosquito *Aedes albopictus*

#1 “nuisance mosquito” in N. Virginia



Susan Ellis, Bugwood.org.

Aedes albopictus may transmit dengue, chikungunya, and may also spread yellow fever, West Nile, and Zika viruses.

futurelearn.com/courses/preventing-zika/0/steps/14641

- Flies and bites only during daylight hours
- Breeds in:
 - small and large containers
 - tree holes
 - natural rock pools
- Travels up to 600 yds

Yellow Fever Mosquito

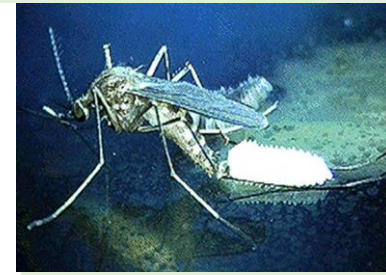
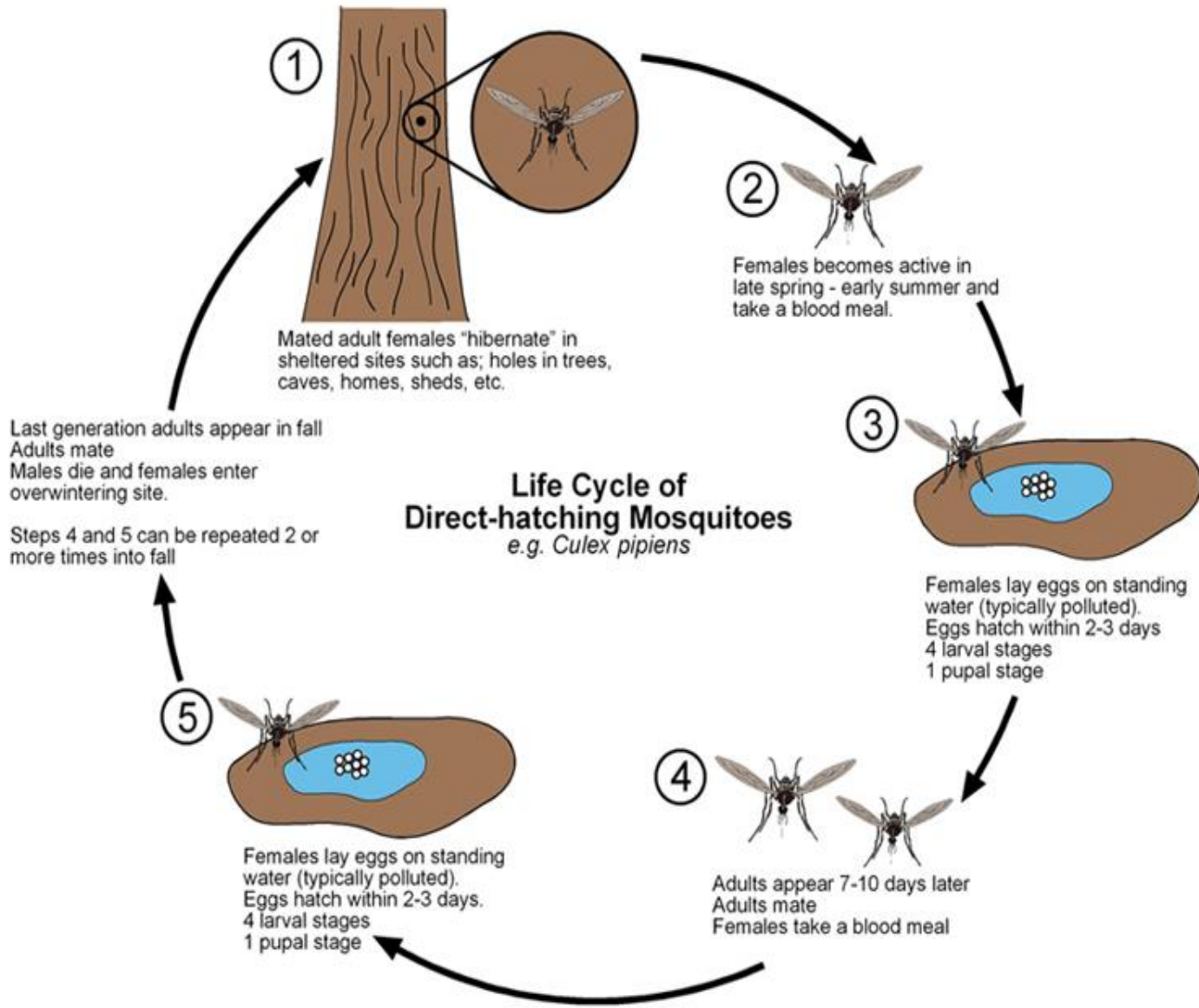
Aedes aegypti



Photo: James M Newman (FMEL)
James M Newman, UF/IFAS/FMEL
floridahealth.gov/diseases-and-conditions/mosquito-borne-diseases/_documents/fl-resident-guide-to-mosquito-control-ifas.pdf

Aedes aegypti mosquito is slightly larger than *A. albopictus*. It is the primary transmitter of dengue, yellow fever, chikungunya, and Zika viruses. It may also transmit West Nile virus.

<https://www.futurelearn.com/courses/preventing-zika/0/steps/14641>



Egg raft from Kansas State Entomology, Kansas State University



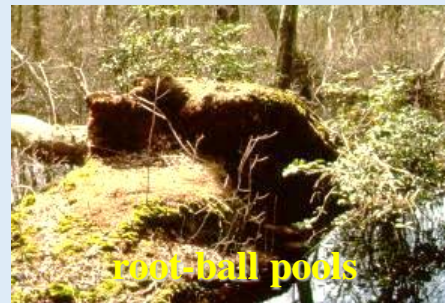
Larvae of *Culex* mosquitoes (Image: James Gathany, CDC)



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

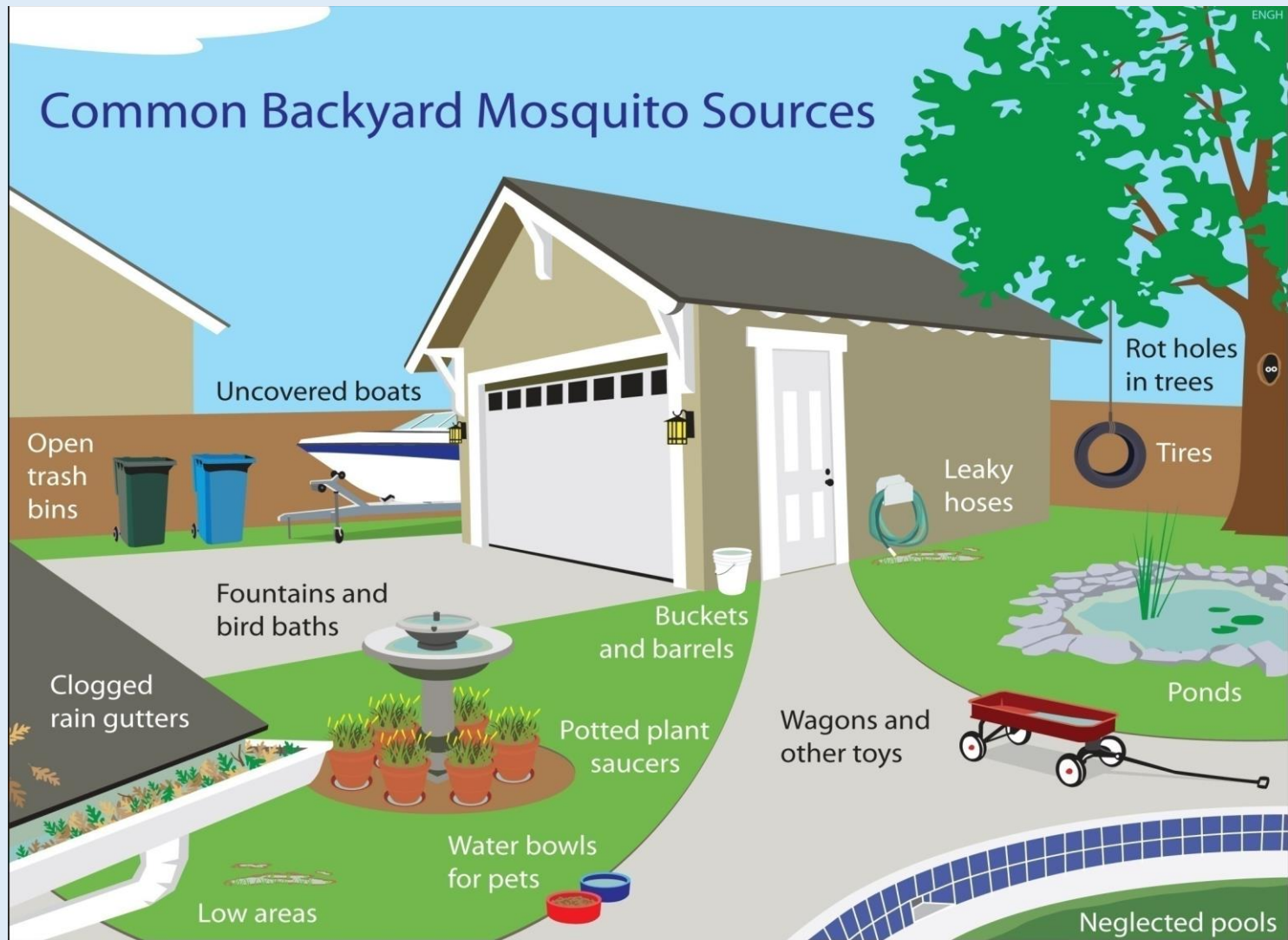
Diagram from Purdue Extension, Entomology, Purdue University

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, VDHVDH--Office of Epidemiology
vdh.virginia.gov/content/uploads/sites/12/2016/02/Mosq_biol_surv__cntrl_1.pdf



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

Where urban mosquitoes breed



**Artificial
Containers**

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

Mosquito Controls

- **Cultural**
 - Remove sites where mosquitoes breed (still water) and rest (e.g., English ivy)
 - Surveillance: where else do mosquitoes gather?
- **Biological**
 - Predators
 - Pathogens and parasites
 - BTi
- **Environmental**
 - Source reduction (get rid of standing water)
 - Exclusion (screens, etc.)
 - Environmental manipulation (recurrent efforts to reduce larval development)
- **Chemical**
 - Oils
 - Insecticides
 - Insect Growth Regulators (IGRs)

Most effective controls are directed at the immature stages

Biological Larval Controls

Fish (e.g., Mosquito fish (*Gambusia sp.*):
minnow-sized fish do well in shallow aquatic habitats such as backyard ornamental ponds/water features that larval mosquitoes prefer.



Western Mosquitofish

by NYS Department of Environmental Conservation
[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)



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****

Self-Protection Clothing and Gear

Anti-mosquito clothing
aliexpress.com/1/32922729598.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” products



Long pants for mosquito protection.
Photo by Leslie Cameron.

Mosquito bedding
nodelcameras97imjbin.com/png/xKujicez4/
[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

Avoid **Broad Spectrum** Pesticides that kill everything.

Resource: npic.orst.edu/pest/mosquito/mosqcides.html

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 and 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 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 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 attract mosquitoes; do not repel them
- 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).
- 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 it every 3-4 days.
- Mosquitoes are weak fliers. Use fans to move air around outdoor social areas.

It's summer. Enjoy the outdoors!

- **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!



clker.com/clipart-mozzy.html

Most Common Ticks of Virginia



American Dog Tick

**Recognize the
TICKS**

**Know the
DISEASES**

**MANAGE the
Exposure**



Deer (Blacklegged) Tick



Lone Star Tick



Brown (Brown Dog) Tick

**Most ticks are
active April to
September
Adult deer ticks
remain active in
winter**

All images from University of Rhode
Island Tick Encounter Center
[tickencounter.org/tick_identification/tick_](http://tickencounter.org/tick_identification/tick_species)
species

Virginia Newcomers



Asian Longhorned tick

Has been confirmed in 24 Virginia counties, including Fairfax and Fauquier.

Eric R. Day, Virginia Polytechnic Institute and State University, Bugwood.org

Gulf Coast Tick

Has been spotted in the Hampton Roads area of Virginia and also in a landfill in Fairfax County.



CDC/Dr. Christopher Paddock

Tick ID

Need to look at:

- Tick size
- Ornamentation
- Mouth parts
- Festoons
- Anal groove

Essentials:

- magnifying glass
- ruler
- comparison pictures

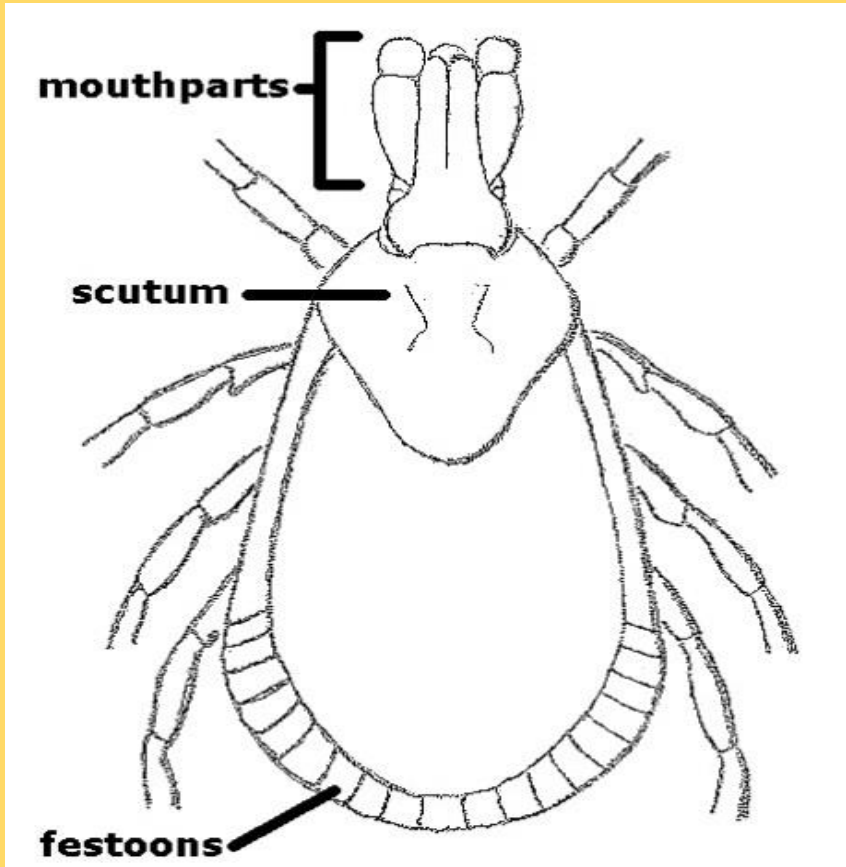


Image: Illinois Dept. of Public Health
dph.illinois.gov/topics-services/environmental-health-protection/structural-pest-control/common-ticks/identification

Size Comparison of Ticks

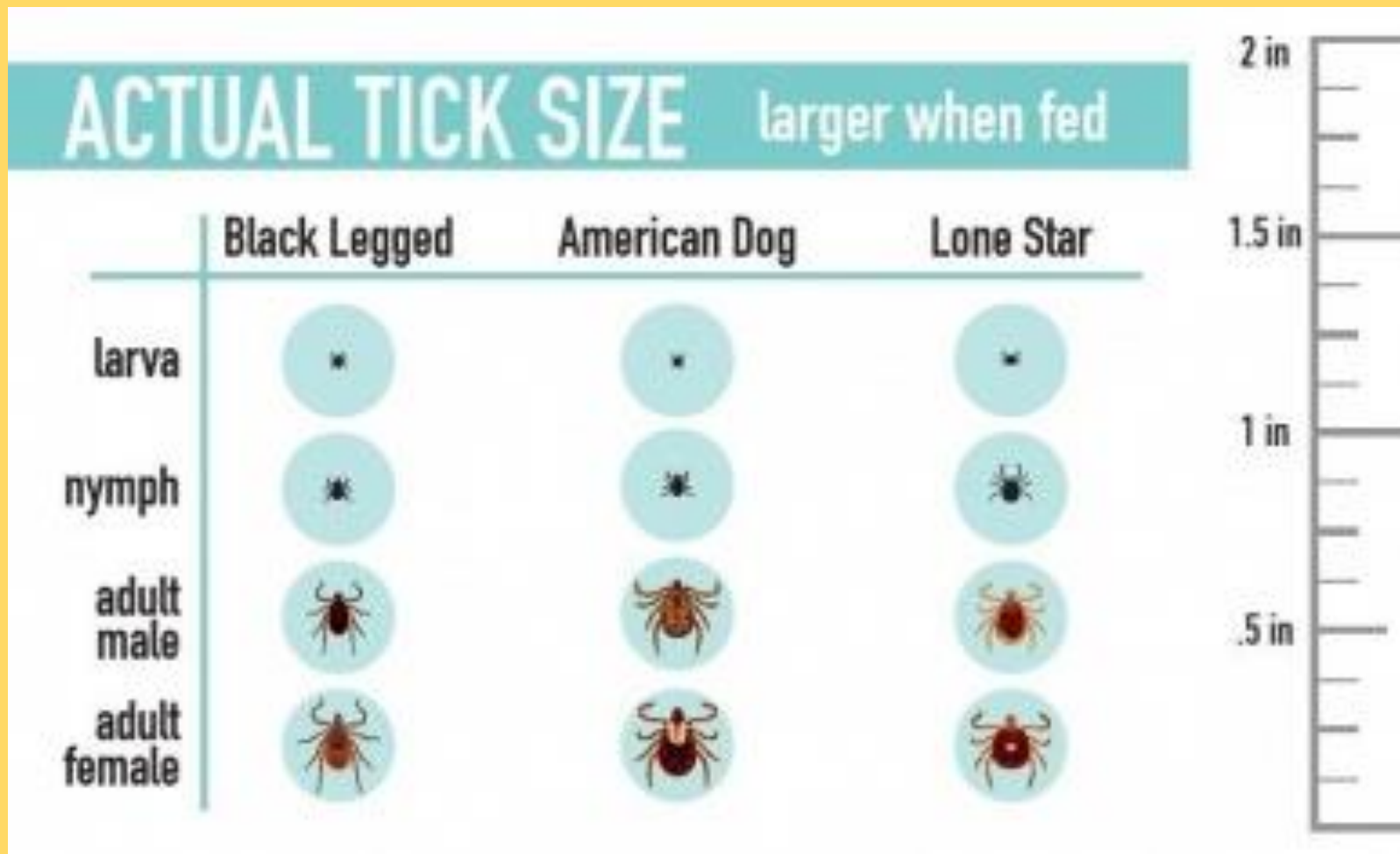
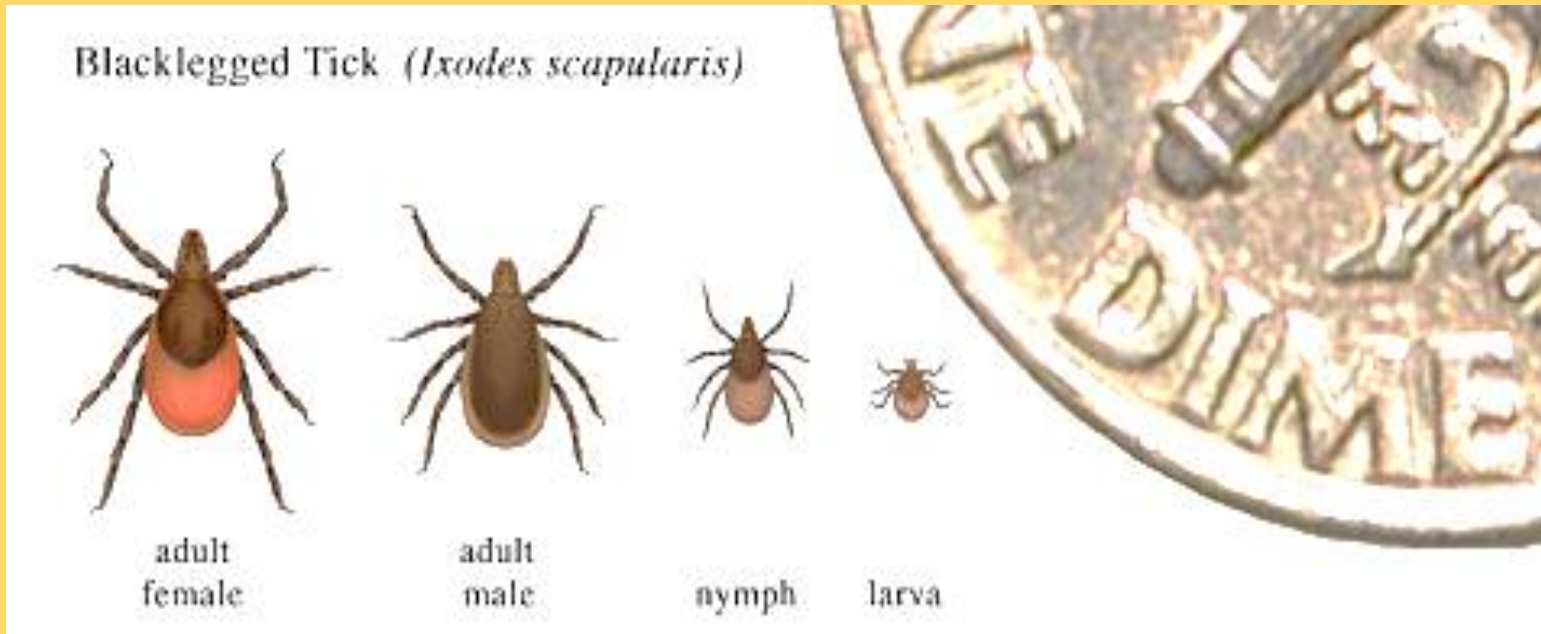
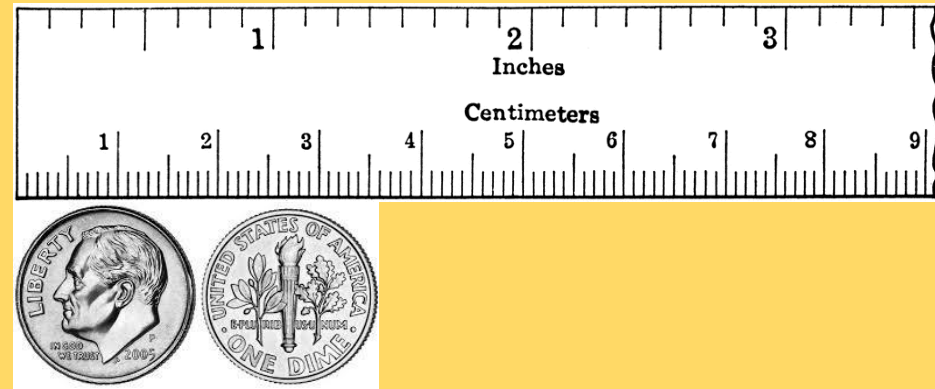


Image: Cornell College of Agriculture and Life Sciences
nysipm.cornell.edu/whats-bugging-you/ticks/what-do-ticks-look/

In general, adult ticks are about the size of a sesame seed and nymphs are about the size of a poppy seed.



From CDC.gov

cdc.gov/lyme/transmission/blacklegged.html



Adult Female American Dog Tick

Gary Alpert, Harvard University, Bugwood.org

American Dog Tick
Dermacentor variabilis,
About 5 mm long with
short stout mouthparts.
It is dark brown with
light wavy lines or
reticulations on its back,
and it has festoons.



American Dog tick larva, nymph,
adult male, adult female

University of Rhode Island Tick Encounter Center
tickencounter.org/tick_identification/dog_tick



5369286

Adult Female Lone Star Tick

Susan Ellis, USDA APHIS PPQ, Bugwood.org

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

University of Rhode Island Tick Encounter Center
tickencounter.org/tick_identification/lone_star_tick

Lone Star Tick

Amblyomma americanum

Up to 5 mm in length with long mouthparts.

It is light reddish-brown, has festoons, and females have a central white spot on the back.



Brown (Brown Dog) Tick

Rhipicephalus sanguineus

About 5 mm long with short stout mouthparts and festoons. It is distinguished from the American dog tick by its dark reddish-brown color and lack of any white markings.



Adult Female Brown Dog Tick

University of Rhode Island Tick Encounter Center
tickencounter.org/tick_identification/brown_dog_tick

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

University of Rhode Island Tick Encounter Center
tickencounter.org/tick_identification/brown_dog_tick



Asian Longhorned Tick

Haemaphysalis longicornis

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



H. longicornis adult female (left), nymph (center), and larva (right).

Photo credit: Manigandan Lejeune, Animal Health Diagnostic Center

Gulf Coast Tick

Amblyomma maculatum

Adults are 5 to 6 mm long with long, narrow mouthparts and festoons. Adult females have a dark brown scutum with stripes.



Adult female Gulf Coast Tick

University of Rhode Island Tick Encounter Center
tickencounter.org/tick_identification/gulf_coast_tick



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

University of Rhode Island Tick Encounter Center
tickencounter.org/tick_identification/gulf_coast_tick



Deer (Blacklegged) Tick

Ixodes scapularis

An adult female is 2 to 3 mm long with long mouthparts. It is reddish or off-white when fed and has black legs. It has NO festoons.

Adult female Blacklegged Tick

Scott Bauer, USDA Agricultural Research Service,
Bugwood.org

Deer Tick larva, nymph, adult male and adult female

University of Rhode Island Tick Encounter Center
tickencounter.org/tick_identification/deer_tick



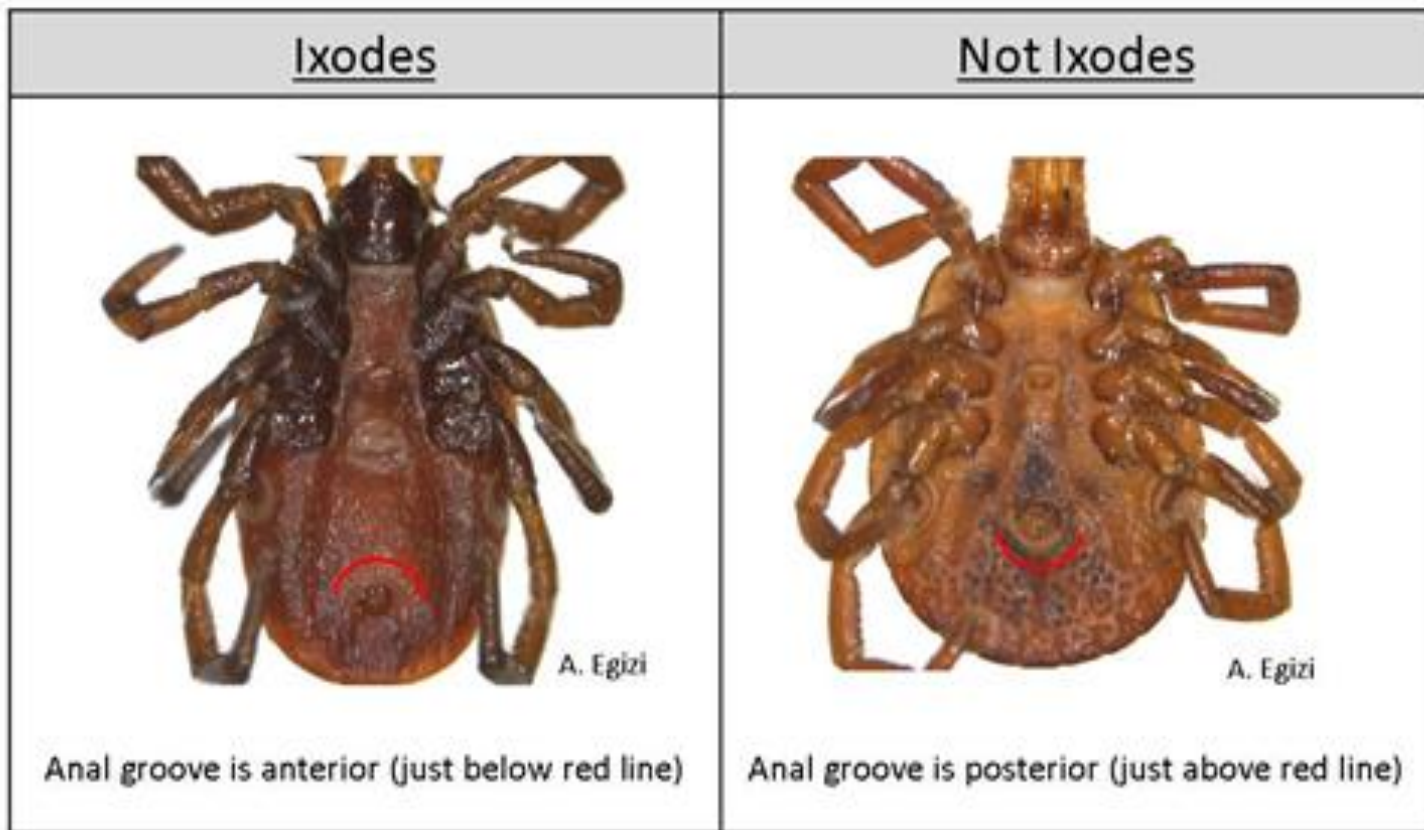
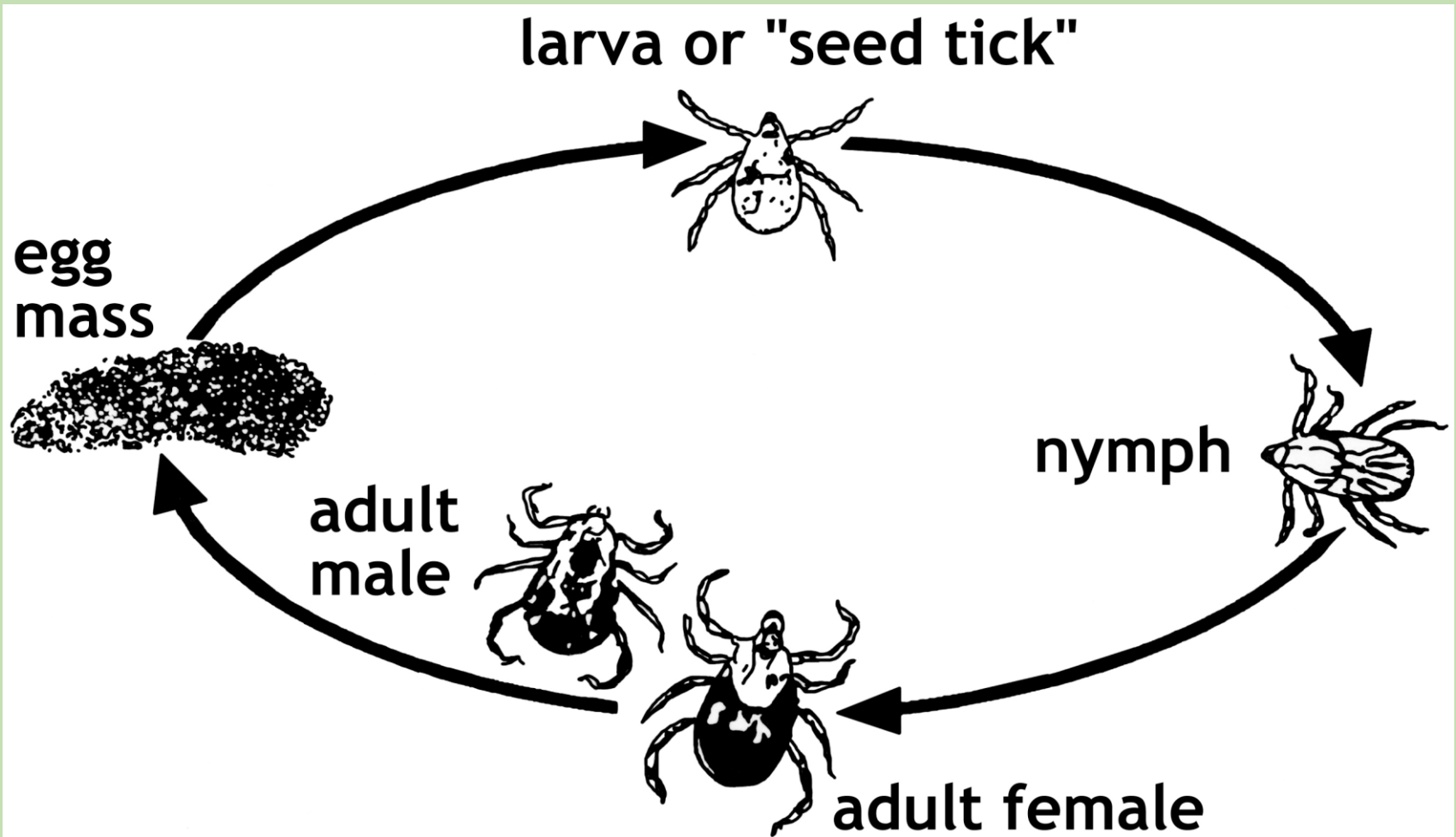


Image: Rutgers Center for Vector Biology website

Deer ticks (Ixodes) have an anal groove above the anus. This differs from non-Ixodes ticks whose anal groove is below the anus. (The anus is on the backside of ticks.)

TICK LIFE CYCLE

ID of life stages



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

Black Legged Tick Life Cycle

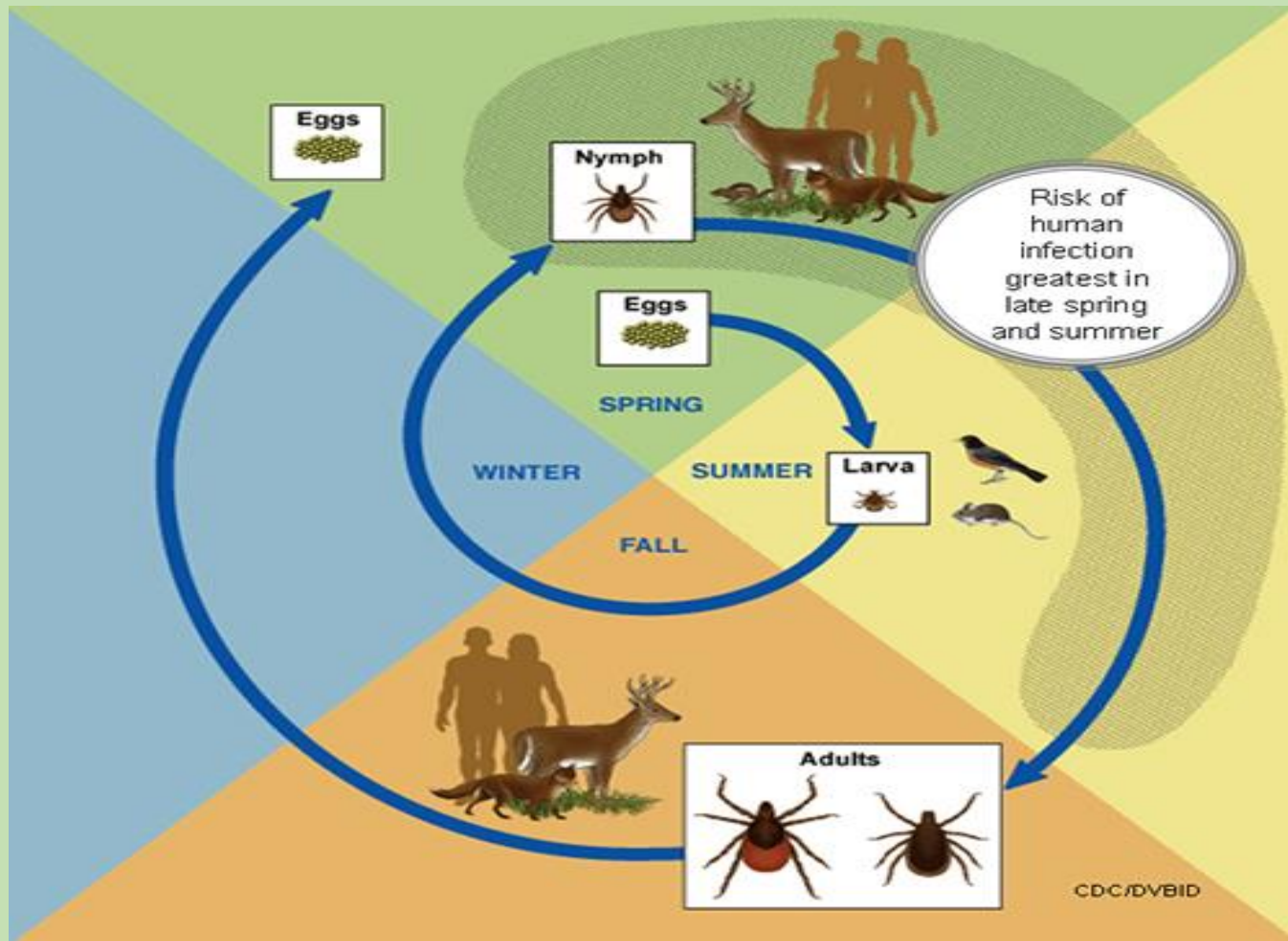


Image courtesy of CDC: cdc.gov/lyme/transmission/blackleggeded.html

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

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.

What to Do? Avoid

**Ticks are most active in VA April – 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)
- 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
- avoid high concentrations: 30% solutions 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

Read Instructions!



Image: sawyer.com/products/permethrin-insect-repellent-treatment/



Image: patch.com/wisconsin/whitefishbay/school-district-will-talk-about-adopting-uniform-pest9c3669b025

Landscape Treatment for Ticks

Sprays have limited effectiveness & are non-selective

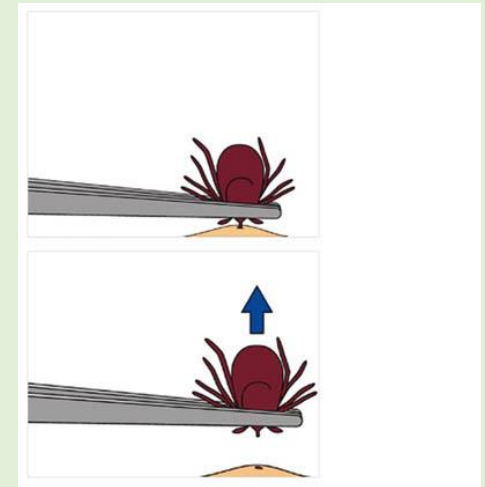
Habitat management: remove or isolate brush, provide air circulation to reduce humidity (which ticks prefer), keep lawns mowed, clean up leaves

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

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

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



University of Maine Cooperative Extension:
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

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

Most Common Tick-Borne Diseases in VA & attachment time for tick to transmit disease

- Lyme Disease (Deer tick) 36 hrs.
- Rocky Mountain Spotted Fever (American Dog, Brown Dog, Lone Star ticks) 2-20 hrs.
- Ehrlichiosis (Lone Star Tick) 24 hrs.
- Anaplasmosis (Deer Tick) 24 hrs.
- Tularemia (American Dog and Lone Star ticks) Unknown
- *Rickettsia parkeri* disease (Gulf Coast and Lone Star ticks) Unknown
- Babesiosis (Deer Tick) 36 hrs.
- Alpha Gal (red meat allergy) (Lone Star tick) Unknown
- Powassan (Deer tick) 15 minutes

Attachment requirements for disease transmission vary.

From: Virginia Department of Health:

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 requires tick attachment for 24-48 hrs
- 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.

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

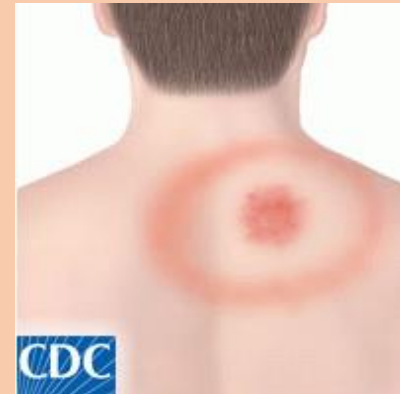


Image 3



Image 4

Image 1: Center for Disease Control and Prevention
cdc.gov/lyme/signs_symptoms/rashes.html

Image 2: Fairfax County Department of Environmental Health
fairfaxcounty.gov/health/fightthebite/tick-diseases

Image 3: Mississippi State Department of Health
msdh.state.ms.us/msdhsite/_static/14,339,227.html

Image 4: University of Maine Cooperative Extension
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: Centers 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: [cdc.gov/rmsf/symptoms/index.html](https://www.cdc.gov/rmsf/symptoms/index.html)

Image 3: [cdc.gov/rmsf/healthcare-providers/signs-symptoms.html](https://www.cdc.gov/rmsf/healthcare-providers/signs-symptoms.html)

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



[publicdomainvectors.org/en/free-clipart/
Female-doctor-vector-image/73105.html](https://publicdomainvectors.org/en/free-clipart/Female-doctor-vector-image/73105.html)

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 Lyme Disease, too

Where to Check Your Pet for Ticks



TLCPETFOOD.COM

1•877•328•8400

Image: TLC Pet Food
tlcpetfood.com/about-tlc/whats-new.asp?show=more

- 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.

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

- **Centers for Disease Control & Prevention: West Nile Info**
 - www.cdc.gov/westnile
- **Virginia Department of Health Mosquito and Tick Disease Info**
 - <http://www.vdh.virginia.gov/environmental-epidemiology/bugs-human-health/>
- **Arlington Environmental Health Department**
 - <https://health.arlingtonva.us/environmental-health/mosquito-information-center/>
- **Alexandria Health Department**
 - <https://www.alexandriava.gov/EnvironmentalHealth#VectorBornIllnessPreventionProgram>
- **Virginia Department of Agriculture and Consumer Services**
 - <http://www.vdacs.virginia.gov/pesticides.shtml>



**Virginia
Cooperative
Extension**

Virginia Tech
Virginia State University



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
Phone: 703-228-6414

Any insect submitted to Help Desk should be dead and preserved in alcohol. For best results, submit the same day as capture and do not subject sample to extreme temperatures. Samples can be left with contact information anytime the building is open.

For a copy of this PPT and more mosquito/tick info:
See: [armn.org/Resources/Mosquitoes & Ticks](http://armn.org/Resources/Mosquitoes%20&%20Ticks)