Ticks!

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Outline

– Tick Biology
– Prevention and Control
– Surveillance Methods
Tick biology and natural history

• 15 species in Wisconsin
• Common species include:

Dermacentor variabilis  
“wood tick”
American dog tick

Ixodes scapularis  
“deer tick”
Black-legged tick
Two common Wisconsin ticks

- **Wood tick**
  - *Dermacentor variabilis*

- **Deer or blacklegged ticks**
  - *Ixodes scapularis*
Go to http://labs.russell.wisc.edu/wisconsin-ticks/
Or Google “Wisconsin Ticks”

Page over to check out the Tick App, our new tool for studying tick exposure and providing mobile information about ticks and tick-borne disease. More than 600 Wisconsinites participated in 2018. The TickApp will launch on May 15 with new features for 2019.
Deer Tick Life Cycle

- Larva
- Nymph
- Female
- Male
Blood feeding adult females

CLICK HERE TO WATCH THEM GROW

Female Adult-stage *Ixodes scapularis*
Growth Comparison

https://tickencounter.org/
How Ticks Dig In With a Mouth Full of Hooks | Deep Look

https://www.youtube.com/watch?v=_IoOJu2_FKE
Blood = eggs
Female then dies
Adult tick hosts

White tailed deer are important for adult blood meals
Blood feeding nymphs (and larvae)

On host for 2-4 days
Many animals can feed larvae and nymphs of deer ticks
Three host tick: acquisition of pathogens
Feed, fall off host into leaf litter; slowly digest blood, molt or lay eggs; find another host
Habitats for deer ticks
Coniferous and deciduous forests
Edge environments
Unusual places where we find a few deer ticks

- Big Bearskin Lake
- Eau Claire
- Mirror Lake
- UW Arboretum
Prevention and Control

**WARNING!**

**TOP 10 TIPS TO REDUCE TICK BITES**

1. Walk in the middle of trails, away from tall grass and bushes.
2. Wear a long-sleeved shirt.
3. Wear white or light-colored clothing to make it easier to see ticks.
4. Wear a hat.
5. Spray tick repellent on clothes and shoes before entering woods.
6. Wear long pants tucked into high socks.
7. Wear shoes—no bare feet or sandals.
8. Use insect repellent with DEET or Picaridin for clothes.
9. Use insect repellent with DEET or Picaridin for clothes.
10. Check for ticks when returning from wooded areas.

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**Protect Yourself Against Lyme Disease in Spring, Summer, and Fall**
Personal Protection

- Light colored clothing, long pants, long sleeves, closed shoes/socks
- Tick repellents
- DEET, Picaridin (20% or higher)
- 0.5% Permethrin to treat clothing
- Frequent tick checks of clothing and skin
- Full-body tick check and shower at end of day
Finding nymphs is hard
Field crew
Personal Protection

• For field crew, white coveralls, or long sleeved shirts and long pants. Closed toe shoes or boots. Socks to draw up over pants. Duct tape?

• Store field clothes in plastic bag or wash and dry using high heat
Removing a tick

A. Arugay 2002
L. A. County West Vector Control District
Tick Identification Services

Tick Identification Service

Identifying the stage and species of a tick is crucial to deciding whether to seek medical attention or not, because tick-borne diseases are only carried by certain ticks in specific regions.

If you’d like to submit a photo or mail a specimen, use the following link:

Identification services

PJ Liesch
@WiBugGuy
http://labs.russell.wisc.edu/insectlab/
Identification services

TickSpotters is a crowdsourced tick survey tool that sources information on tick encounters from around North America, and provides users with tailored risk assessment reports.

By submitting a tick photo and completing the submission form, you are actually taking part in a research study. The purpose of the study is to track tick distributions, seasonal trends, and encounter factors for humans and pets. Please read the following before agreeing to be in the study.

By undelcicking "I AGREE", you are opting to exclude your submission from our study.

✔️ I Agree

Select a File

Please upload your tick photo here. (Please check - file size must be less than 25MB)

* required fields

First Name

Last Name
Tick testing

- Surveillance versus the general public
  - For surveillance goals, CDC may test under certain conditions
- For general public, several providers will test ticks for a fee
- CDC does not recommend tick testing for the general public
# Lyme Disease Control Toolbox

<table>
<thead>
<tr>
<th>Personal Protection Measures</th>
<th>Treatment/Vaccination in Humans</th>
<th>Landscape/Vegetation Management</th>
<th>Killing of Host-Seeking Ticks</th>
<th>Rodent-Targeted Approaches</th>
<th>Deer-Targeted Approaches</th>
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</thead>
<tbody>
<tr>
<td>Avoidance of tick habitat</td>
<td>Antibiotic prophylaxis after tick bite</td>
<td>Xeroscaping/Hardscaping</td>
<td>Synthetic chemical acaricide</td>
<td>Topical acaricide bait box</td>
<td>Topical acaricide feeding station</td>
</tr>
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<td>Physically protective clothing</td>
<td>Human vaccine</td>
<td>Keep grass short, remove weeds</td>
<td>Natural product-based acaricide</td>
<td>Oral vaccine</td>
<td>Deer reduction</td>
</tr>
<tr>
<td>Regular tick checks &amp; Prompt removal</td>
<td>Remove leaf litter and brush</td>
<td>Fungal acaricide</td>
<td>Oral antibiotic bait</td>
<td>Deer fencing</td>
<td></td>
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<tr>
<td>Synthetic chemical repellent</td>
<td>Remove rodent harborage</td>
<td>Oral tick growth regulator</td>
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<tr>
<td>Natural product-based repellent</td>
<td>Avoid plants that attract deer</td>
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<td>Anti-tick vaccine for deer</td>
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<td>Permethrin-treated clothing</td>
<td>Move play structures to low risk areas</td>
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<td>Natural product-based acaridal soap/lotion</td>
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Note: Yellow text denotes intervention that is not currently available but under development

[https://www.bayarealyeme.org/blog/cdc-talk/](https://www.bayarealyeme.org/blog/cdc-talk/)
Evidence-based tick control

- Landscape management
- Barrier sprays between woods/grassy yards
- Target mice
The Tick App: 2019

- **Information for you:**
  - Tick 101
  - Coming this year:
    - Tick Activity
    - Tick identification

- **Information provided by you:**
  - Daily log: What (outdoor) activities do you do?
  - Report-a-Tick: What tick species do you find? Where did you get it? What were you doing?

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What is it about? Lyme disease! And other things related to ticks: how to identify them, how to report them and, most importantly for the research team, it asks about your whereabouts and tick encounters.

This is research? Yes, and it also reminds you to check for ticks and take precautions to not get bitten!

What do I need to do? How can I participate?
1. Download the app (>18y old)
2. Complete the consent form and enrollment questions
3. Start filling in daily tick diaries

More information: www.thetickapp.org or tickapp@wisc.edu

What is in it for me?
1. You have a free reminder to check for ticks
2. You can report a tick at any time
3. Your shared information helps to identify risk factors for tick encounters and this will be used to develop better prevention strategies.

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Survey of knowledge and behaviors related to ticks and tick control
Surveillance for I. scapularis deer ticks in Wisconsin
Hunter killed deer - Tick Surveys

Dark color of the pie = % deer infested with *Ixodes* ticks.
Deer ticks in the Upper Midwest
Established (red), Detected (blue)
or no information (white)

Surveillance for deer ticks

1. Classify county status for *Ixodes scapularis*
   - Established: more than 6 *I. scapularis* of a single life stage or more than 1 life stage collected per county within a 12 month period
   - Reported: less than 6 *I. scapularis* of a single life stage collected per county within a 12 month period
   - No records
County Status for Deer tick (blacklegged tick) Distribution in Wisconsin

2019 priority counties are green and white

-Voucher specimens
-Once red, stays red
Summary of methods that can be used for establishing county status

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Surveillance for deer ticks

1. Classify county status for Ixodes scapularis
2. Classify county status for presence of specific pathogens in ticks
*Borrelia burgdorferi* presence in questing nymphs
Surveillance for deer ticks

1. Classify county status for *Ixodes scapularis*
2. Classify county status for presence of specific pathogens in ticks
3. Generate estimates for prevalence of pathogens in nymphs or adults and density of host-seeking infected nymphs or adults: RISK ESTIMATES
4. Document host-seeking phenology of all life stages
2018 Nymphal Infection rates for Borrelia burgdorferi

- **16%**: Burnett
- **18%**: Polk
- **28%**: Price
- **31%**: Oneida
- **0%**: Florence
- **8%**: Forest
- **2%**: St. Croix
- **7%**: Sauk
- **18%**: Dane
- **28%**: Door
- **2%**: Milwaukee

Map showing infection rates across various counties in Wisconsin.
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<th>Objective: Presence/Prevalence of pathogens in ticks</th>
<th>Objective: DON/DIN or DOF/DIF</th>
<th>Objective: Phenology</th>
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Collecting Nymphs by Dragging

Nymphs do most of the Lyme Disease transmission
Peak is in June but nymphs continue to be active until fall
Questing
Surveillance for deer ticks

- Report # of questing nymphs per 100m² (=DON; density of nymphs)
- Requires at least 750 m² dragged per site; inspect drags every 10-20 m; sample at peak nymphal activity period
  Estimate based on 2-3 visits to site during seasonal peak
- Peak for nymphs is June through 1st 1-2 weeks in July.

- Requires at least 1 site sampled per county but multiple sites representing the range of suitable habitat is better
- Only distance-based Density of Nymphs (DON) is accepted by CDC for comparing across sites
Sampling tips

• Don’t sample when it’s raining
• Don’t sample when it’s cold or windy
• Don’t sample when vegetation is wet and saturates the drag
• Noon seems to be a lull in activity
• Sometimes early evening is good
Ticks for testing

- Usually not from animals
- 25-50 nymphs
- 70-95% Ethanol
- RNALater (Powassan virus)
- Frozen at -80 without preservatives