An Updated Report on Ticks and Tick-borne Disease in Ohio

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Ticks are not like other parasites

Ticks
- Class: Arachnida
  - Head, thorax, and abdomen fused
  - 8 jointed legs as nymphs/adults
  - Simple metamorphosis (Hemimetabolous)
  - May use up to 3 hosts
  - Spends majority of life off host

Fleas
- Class: Insecta
  - Head, thorax and abdomen distinct
  - 6 jointed legs as adults
  - Complex metamorphosis (Holometabolous)
  - Prefers to stay on 1 host
  - Obligate parasites

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Ticks are specialized blood feeders

- Ticks find hosts by CO_2 detection and questing
- Ticks attach to host by ambush or hunting up to several meters
- Tick saliva has anti-inflammatory, anti-coagulatory, and anesthetic properties
- Ticks secrete cementum to assist attachment
- Slow feeders, several days to engorge
- Salivary glands primary site for excreting excess water and transmission of pathogens
- Once feeding is complete, secreted enzymes digest cement to detach

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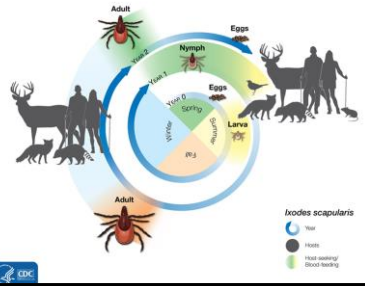
Ticks have 4 life stages



Nymph on fingernail (M. Greenwood, Yale)

- Multi-host
- Long-lived
- Often very small
- Nymphs + adults most concerning

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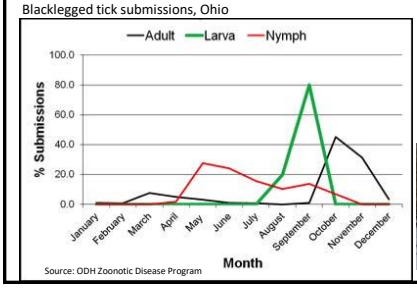
Ticks are active year round

Blacklegged tick submissions, Ohio



Source: ODH Zoonotic Disease Program

BUT ticks will seek hosts <u>anytime</u> the ambient temp is above freezing, even with snow on the ground!

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Ticks look different when engorged

Color is unreliable!

Female Adult-stage *Ixodes scapularis* Growth Comparison

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Not all ticks are the same

- Variation in:
  - Distribution
  - Habitat
  - Host preference
  - Seasonal occurrence
  - Longevity
  - Diseases vectored

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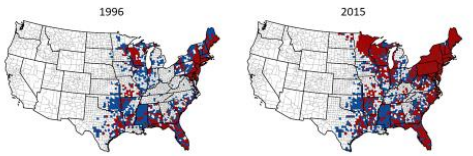
Tick distributions are expanding

Reported Distribution of *I. scapularis* has expanded



Eisen *et al* 2016

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Ohio has an invading tick problem

American dog tick
(*Dermacentor variabilis*)

Blacklegged 'deer' tick
(*Ixodes scapularis*)

Lone Star tick
(*Amblyomma americanum*)

Native, pre-2000

Native invaders, 2020

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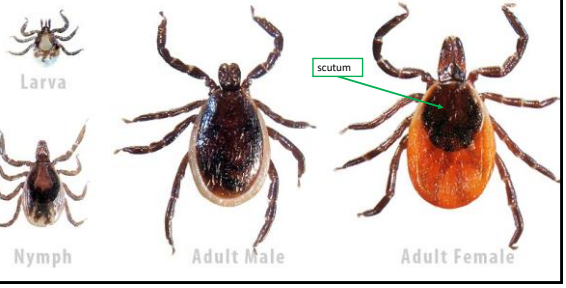
TickEncounter Resource Center Ixodes scapularis (Blacklegged ticks or Deer ticks)



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Ixodes scapularis (Blacklegged tick)

DISTRIBUTION

- Eastern and midwestern U.S.

ASSOCIATED DISEASES

- Lyme disease (human, canine, feline, equine)
  - *Borrelia burgdorferi, Borrelia mayonii*
- Anaplasmosis (human, equine)
  - *Anaplasma phagocytophilum*
- Babesiosis (human)
  - *Babesia microti*
- *Borrelia myamotoi* disease (human)
- Powassan virus disease (human)

As of 2018

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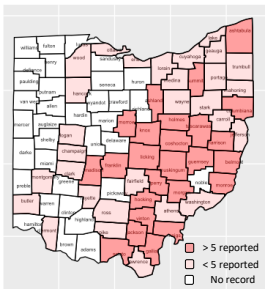
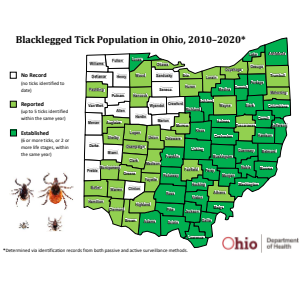
Ohio blacklegged tick distribution *2020*





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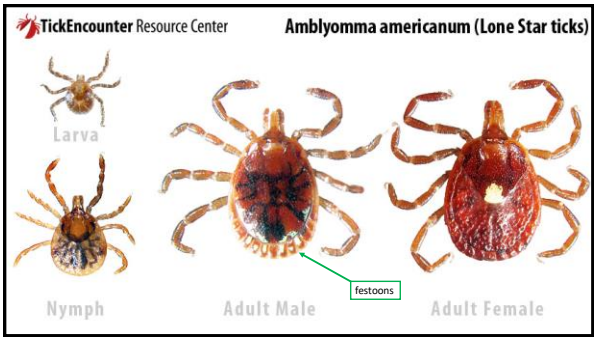

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Amblyomma americanum

DISTRIBUTION

- Eastern and midwestern U.S.

ASSOCIATED DISEASES

- Ehrlichiosis
  - *Ehrlichia chaffeensis, Ehrlichia ewingii*
- Tularemia
  - *Francisella tularensis*
- Cytauxzoonosis
  - *Cytauxzoon felis*
- Heartland virus (human)
- Bourbon virus (human)
- Mammalian meat allergy (human)

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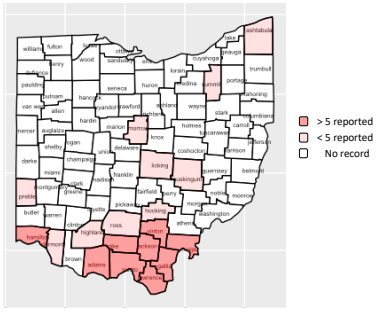
Ohio Lone star tick distribution 2020



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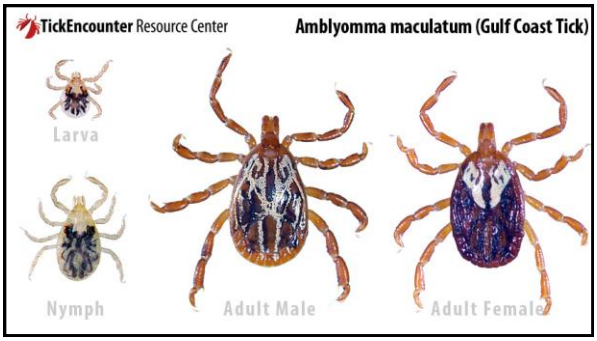

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Amblyomma maculatum

DISTRIBUTION

- Eastern and midwestern U.S. (expanding)

ASSOCIATED DISEASES

- Canine hepatozoonosis
  - *Hepatozoon americanum*
- Human spotted fever rickettsiosis
  - *Rickettsia parkeri*

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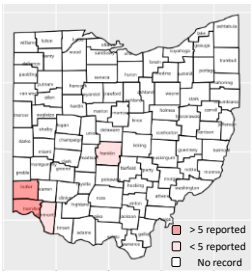
Gulf Coast ticks established in Ohio in 2020!



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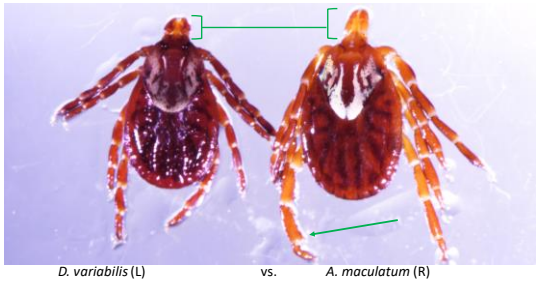
GCT often confused with *Dermacentor* spp.



D. variabilis (L) vs. *A. maculatum* (R)

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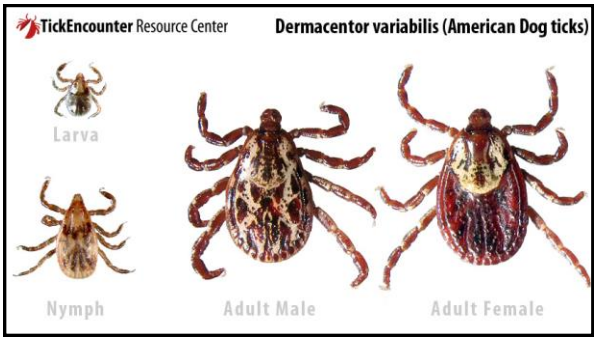

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Dermacentor variabilis

DISTRIBUTION

- Eastern, midwestern, and intermountain region U.S.
- Populations also on the Pacific coast

ASSOCIATED DISEASES

- Rocky Mountain Spotted Fever
  - *Rickettsia rickettsi*
- Cytauxzoonosis
  - *Cytauxzoon felis*
- Tularemia
  - *Francisella tularensis*
- Anaplasmosis (bovine, ovine)
  - *Anaplasma marginale*
  - *Anaplasma ovis*

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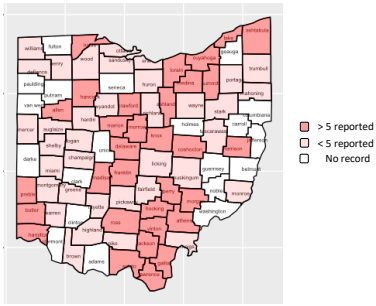
Ohio American dog tick distribution 2020



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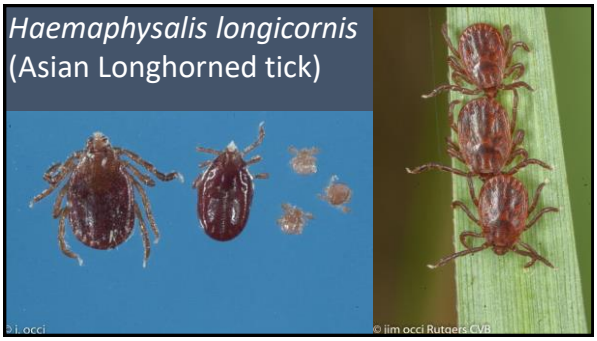
Haemaphysalis longicornis (Asian Longhorned tick)



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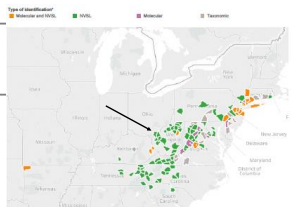
Haemaphysalis longicornis

DISTRIBUTION

- Now 15 U.S. states, Australia, New Zealand, Asia (globally distributed)

ASSOCIATED DISEASES

- Intense infestations w/ severe anemia
- Bovine theileriosis
  - *Theileria orientalis*
- Rocky Mountain Spotted Fever
  - *Rickettsia rickettsia* (laboratory only)
- Numerous pathogens internationally
  - *Borrelia, Bartonella, Anaplasma, Ehrlichia*



USDA Situation Report, as of February 2021

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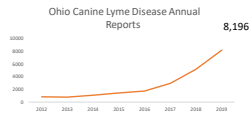

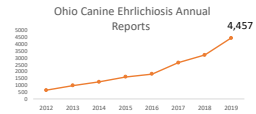

Sources: human data from CDC NNDSS and ODH, canine data from Companion Animal Parasite Council https://capcvet.org

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Knowledge gaps in Ohio

- What is the geographic distribution and preferred habitats of Lone star ticks, Gulf Coast ticks, and Asian Longhorned ticks in Ohio?
- How has the abundance of Blacklegged ticks and prevalence of *B. burgdorferi* changed in the decade since establishment in Ohio?
- What is the risk of tick-borne pathogens in our urban greenspaces?
- What are the preferred hosts for blacklegged ticks and *B. burgdorferi* in Ohio?
- Are some communities, like those with outdoor occupations, at greater risk of tick-borne disease in Ohio?

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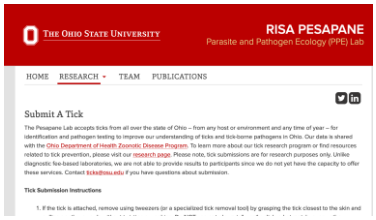
Tick reporting is important!



Visit my lab website
u.osu.edu/pesapane
or email
ticks@osu.edu

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Options for prevention

Protective clothing options
- Permethrin-treated now available too
- ohio.gov/ticks

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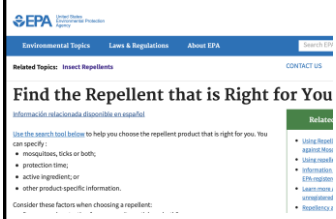
Options for prevention



Use tick repellent products that contain:
- DEET
- Picaridin
- IR3535
- 2-undecanone
- Oil of Lemon Eucalyptus (OLE)*
- Para-menthane-diol (PMD)*

For clothing and gear:
- Permethrin
- DEET

*Not for children < 3 years old. NOT the same as lemon essential oils!

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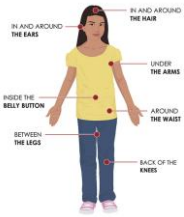
Options for prevention



cdc.gov

Tickencounter.org

Tickencounter.org

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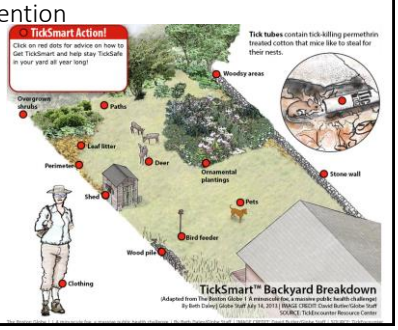
Options for prevention

Most people encounter ticks close to home

Children under 10 most at risk

Create tick-free zones in your yard. Eliminate habitat for ticks or the animals they parasitize!



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Options for prevention

- Keep kids play areas away from tick habitat
- Create a tick barrier between your yard and tick habitat

Create a tick-safe zone similar to this play area by using landscaping techniques mentioned above to make your yard inhospitable to ticks. This is especially important when your yard is bordered by tick habitat.

ohio.gov/ticks

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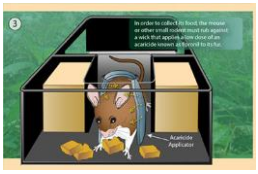
Options for prevention



- Tick tubes
- Bait boxes
- Four posters

Variable efficacy!

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Options for prevention

Landscape pesticide applications?

Spraysafeplaysafe.org

Variable efficacy?

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A new era of ticks and tick-borne disease in Ohio

American dog tick | Blacklegged tick | Lone Star tick | Gulf Coast tick | Asian Longhorned tick

We now have 5 medically important tick species in the state!

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Submit your ticks at u.osu.edu/Pesapane or ticks@osu.edu

What questions do you have?

Contact me
Pesapane.1@osu.edu
@RisaPesapane

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