

Tick-borne Diseases Ohio Summary, 2011



Zoonotic Disease Program
Bureau of Infectious Diseases
Ohio Department of Health



INTRODUCTION

During 2011, the Ohio Department of Health's Zoonotic Disease Program (ZDP) identified 2,433 ticks (Table 1). These ticks were submitted from local health departments and veterinarians (passive surveillance), and also through screening deer and other wildlife for ticks (active surveillance). Nine of the 13 tick species known to occur in Ohio were identified. One gulf coast tick, *Amblyomma maculatum*, an occasional bird hitchhiker from the Southern United States, was identified from Wayne County.

Table 1: Ohio ticks identified by ODH Zoonotic Disease Program in 2011



Species of Tick	Common Name	Number Identified	Percent of Total
<i>Amblyomma americanum</i>	Lone Star Tick	43	1.8%
<i>Amblyomma maculatum</i>	Gulf Coast Tick	1	<0.1%
<i>Carios kelleyi</i>	Bat Tick	1	<0.1%
<i>Dermacentor albipictus</i>	Winter Tick	7	0.3%
<i>Dermacentor variabilis</i>	American Dog Tick	307	12.6%
<i>Haemaphysalis leporispalustris</i>	Rabbit Tick	4	0.2%
<i>Ixodes cookei</i>	Groundhog Tick	40	1.6%
<i>Ixodes dentatus</i>	Rabbit Ixodes Tick	2	0.1%
<i>Ixodes scapularis</i>	Blacklegged Tick	2014*	82.8%
<i>Ixodes</i> species	Damaged Specimens	12	0.5%
<i>Rhipicephalus sanguineus</i>	Brown Dog Tick	2	0.1%
Grand Total		2433	100.0%

* Includes 184 passive submissions from 30 counties plus 1830 ticks collected from 98 whitetail deer heads from 25 counties during a surveillance project in November 2011.

Most tick species are rarely encountered because they are associated with wildlife and do not transmit diseases to people. There are three species, though, that are associated with human disease: the blacklegged tick, *Ixodes scapularis*; the American dog tick, *Dermacentor variabilis*; and the lone star tick, *Amblyomma americanum*. These three ticks are also the most common ticks in Ohio found on people and their pets. All of these ticks are active in Ohio from early spring until late autumn and, in the case of the blacklegged tick, on warm days during the winter. This report addresses these three species and the diseases they transmit. In particular, the blacklegged tick dramatically increased in number and distribution in 2011. In 2011, 86 people were confirmed with a tick-borne disease in Ohio (Appendix A), about the same (78 cases) as in 2010.

People working and playing outdoors in wooded or weedy areas may be exposed to ticks and possibly tick-borne diseases such as Rocky Mountain spotted fever (RMSF), Lyme disease and ehrlichiosis. Not all tick species carry and transmit every disease, so it is important to identify ticks to better estimate disease risk.



BLACKLEGGED TICKS (vector of Lyme disease, anaplasmosis and babesiosis)

In the eastern United States, the blacklegged tick, *Ixodes scapularis*, also known as the “deer tick” (Figure 1), is the vector of Lyme disease, anaplasmosis and babesiosis. At least one of the three life stages of this tick is active during all but the very coldest months (Figure 2). The larvae hatch and become active during the mid to late summer from eggs which are laid in the spring by adults. The larvae do not transmit Lyme disease. Once fed, they will go dormant until the following spring when they emerge as nymphs. This is the first stage that can transmit Lyme disease. Nymphal blacklegged ticks, which are quite small, are active in late spring and summer when people are outdoors and likely to be exposed. The adults are most active in fall and winter and they are most often picked up by hunters and outdoor enthusiasts. This stage can also transmit Lyme disease, but it is often detected due to its larger size and removed before disease transmission occurs.

The habitat for this tick is primarily deciduous forest, especially in areas with leaf litter on the ground. The leaf litter provides protection from the elements and when removed, tick populations may be reduced by 70 to 100 percent.

This tick was once considered rare in Ohio, with only 35 ticks identified from within the state during the 20 year period of 1989-2008. Over the last few years, the number of submissions of blacklegged ticks has steadily increased. The most dramatic increase, however, occurred in 2011, when 2,014 blacklegged ticks were identified (Table 1). These included 184 ticks received



Figure 1. Blacklegged Tick, *Ixodes scapularis*

Ixodes scapularis in Ohio

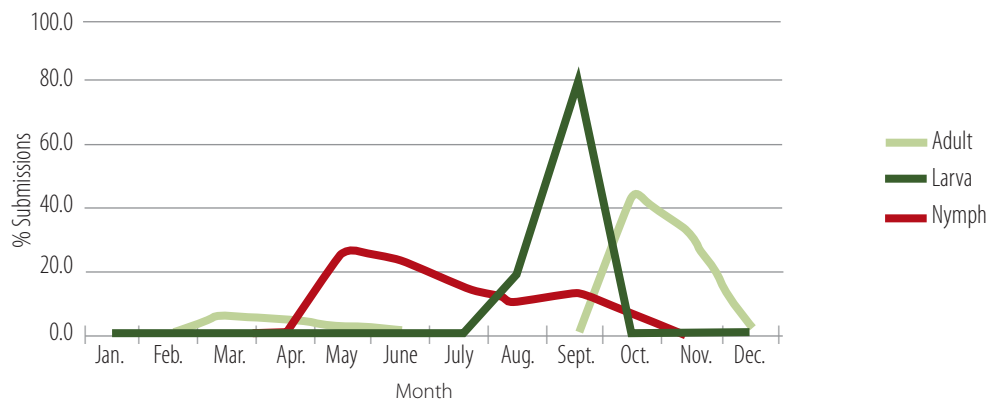


Figure 2. Unlike other ticks, *Ixodes scapularis* are active throughout the year in Ohio. The adults are active in spring, fall and winter. The nymphs are active in the spring and summer and the larvae are active late summer.



The low number of Lyme cases in Ohio has been attributed to the absence of blacklegged ticks, the vector transmitting *Borrelia burgdorferi*.

In 2011, Ohio reported 53 cases of Lyme disease to the CDC (Appendix A). Since 1990, Ohio has reported 1,088 cases of Lyme disease from 83 of 88 counties. Data from this period show that about half of Ohio's cases of Lyme disease had no travel history. This means people acquired Lyme disease in Ohio, despite the fact that blacklegged ticks were rarely found here. As encounters with this tick are sure to increase in Ohio due to its expanding range, an increase in the number of Lyme disease cases may follow if prevention measures are not taken by Ohio residents. ODH will continue surveillance for this disease and its vector in addition to educating Ohio residents about disease prevention.

Symptoms: The first sign of a Lyme disease infection, seen in 60 to 80 percent of cases, is the characteristic "bull's-eye" rash called erythema migrans. The rash develops at the site of tick attachment and usually appears seven to 14 days after tick exposure. This rash grows in size as it expands outward from the bite site. Other symptoms may include muscle aches, general tiredness, fever, swollen glands, headache and joint pain.

Anaplasmosis in Ohio

Anaplasmosis, previously known as human granulocytic ehrlichiosis (HGE) and more recently referred to as Human Granulocytic Anaplasmosis (HGA), is a disease caused by a species of bacteria, *Anaplasma*

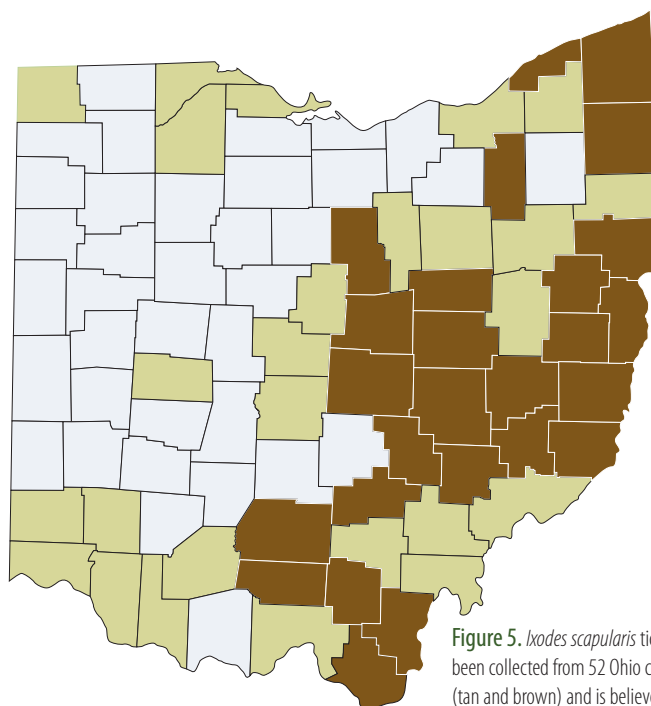


Figure 5. *Ixodes scapularis* ticks have been collected from 52 Ohio counties (tan and brown) and is believed to now be established* in 26 Ohio counties (brown).
*Criteria based on at six ticks to two life stages identified.

phagocytophilum, which is transmitted through the bite of the blacklegged tick. It may cause disease in humans and animals such as dogs, cattle, sheep and horses. There were nine cases of anaplasmosis confirmed in Ohio in 2011 (Appendix A).

Symptoms: The symptoms of HGA may be confused early on with common infections such as influenza. Onset may begin up to three weeks after a tick bite. Initial symptoms may include fever, headache and muscle aches. Other symptoms may include nausea, joint pain, chills, confusion and sometimes a rash. HGA may cause severe illness, especially if left untreated, and about half of all patients require hospitalization. The elderly and those with compromised immune systems are at most risk for developing more severe disease. The mortality rate is two to three percent.



AMERICAN DOG TICK (vector of Rocky Mountain spotted fever)

The American dog tick, *Dermacentor variabilis* is the primary vector of Rocky Mountain spotted fever (RMSF) in the eastern United States (Figure 6). In Ohio, this tick is widespread and abundant. The American dog tick is most active from April through July. This tick will bite and feed on any available mammal, including humans.



Figure 6. American Dog Tick, *Dermacentor variabilis*

Rocky Mountain Spotted Fever in Ohio

In 2011, Ohio reported 21 human cases of RMSF to the CDC (Appendix A). While RMSF occurs throughout Ohio, more cases occur in the southern half of the state and almost half of all human cases have been reported from three counties; Clermont, Franklin and Lucas. From 2000 to 2011, there were 195 cases of RMSF and one death in Ohio.

RMSF is caused by the bacterium, *Rickettsia rickettsii*. Larval and nymphal ticks become infected with *R. rickettsii* while feeding on blood from an infected host and a female tick can transmit *R. rickettsii* to her eggs through a process called transovarial transmission. Once infected, the tick can carry the pathogen for life. The bacteria are transmitted through tick saliva while feeding. It usually takes several hours of attachment and feeding for the bacteria to be transferred to the host. Only one to three percent of the tick population carries *R. rickettsii* (even in areas where the majority of human cases are reported); so risk of exposure to an infected tick is low.

Symptoms: The incubation period for RMSF is two to 14 days after tick bite or contact. Symptoms include a sudden onset of fever, headache and flu-like symptoms, often followed by the characteristic spotted rash. The rash first appears at the wrists and ankles and may spread to the torso, palms and soles. If not treated with antibiotics, the disease has a fatality rate of four percent.



LONE STAR TICK (vector of Ehrlichiosis)

The lone star tick, *Amblyomma americanum*, is a common tick in the southeastern United States and is found throughout Ohio, but most often in the southern half of the state (Figure 7). These ticks are active from mid-spring through late-autumn in Ohio. The larval stages of this tick are often referred to as seed ticks and can be particularly troublesome to hikers and outdoor enthusiasts during the warm months.

The lone star tick is the principal vector of ehrlichiosis in humans and is also considered a vector of tularemia in wildlife and humans. White-tailed deer are a major host for this tick and are a natural reservoir of the bacteria.

Ehrlichiosis in Ohio

Human monocytic ehrlichiosis (HME), or ehrlichiosis, is caused by one of a few species of bacteria that are related to, but different from, the species causing anaplasmosis (HGA). HME is transmitted to humans through the bite of a lone star tick. There were five cases of ehrlichiosis confirmed in Ohio in 2011 (Appendix A). In addition, there was one undetermined case in Franklin County which was either HME or HGA.

Symptoms: As with HGA, the symptoms of HME may be confused early on with common infections such as influenza. Onset may begin up to three weeks after a tick bite. Initial symptoms may include fever, headache and muscle aches. Other symptoms may include nausea, joint pain, chills, confusion and sometimes a rash. HME may cause severe illness, especially if left untreated, and about half of all patients require hospitalization. The elderly and those with compromised immune systems are at most risk for developing more severe disease. The mortality rate is two to three percent.

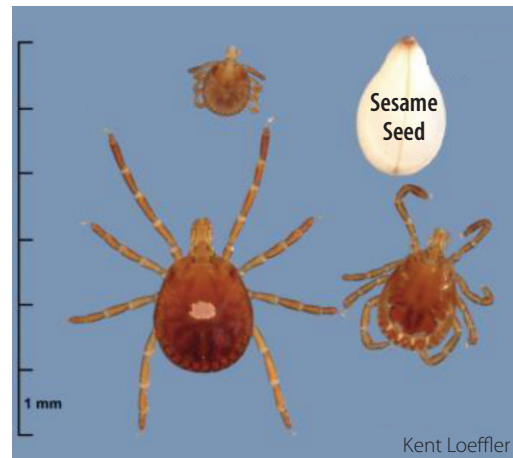


Figure 7. Lone Star Tick, *Amblyomma americanum*



NOTE TO PHYSICIANS:

Physicians should ask patients about tick exposures when presented with patients with febrile and rash illnesses. Because blacklegged ticks are now established in Ohio, Lyme disease should be considered as a possible differential when typical symptoms are present.

Laboratory testing for tick-borne infections is time-sensitive. Serological tests may be falsely negative in patients with early disease, but quite reliable for diagnosing later stages of disease. Therefore, an acute serologic titer will not rule out infection and a second, convalescent sample is usually necessary to confirm the diagnosis. Treatment should not be delayed pending the receipt of laboratory test results, or be withheld on the basis of an initial negative finding for a tick-borne disease.

Tick-borne diseases are a Class B2 reportable disease in Ohio and results should be reported to the local health department in the county or city where the patient resides by the end of the work week. Laboratory confirmation is needed to confirm most of the tick-borne infections other than Lyme disease, where a physician-observed erythema migrans rash alone meets case definition criteria. Laboratory testing or antibiotic treatment is not recommended for patients bitten by ticks without symptoms of Lyme disease.

PREVENTION OF TICK-BORNE DISEASES

Avoiding exposure to ticks is the best way to prevent tick-borne diseases such as Lyme disease and RMSF. Ticks prefer tall grass and brushy areas with leaf litter, so avoid those areas whenever possible. When hiking, stay in the middle of the trail as high grass on the edges of paths is a perfect tick habitat. Keep grassy, outdoor play areas and yards well-mowed to discourage tick infestations.

When going into areas where ticks may be present:

- Tuck your pants into your socks to keep the ticks away from your skin
- Wear light-colored clothing. This will make it easier to find crawling ticks
- Use repellents, such as 20 percent DEET, and follow label instructions carefully
- Check for ticks frequently, especially on children
- Shower within two hours of coming indoors to prevent ticks from attaching
- Remove any attached ticks promptly and carefully



Protect Your Pets

Dogs can also develop tick-borne diseases. In addition, they can bring ticks home with them. During tick season (April to August) dogs should be kept or walked in well-mowed areas whenever possible. Inspect dogs for ticks every day (Figure 8) and if any are found, remove them promptly and carefully. There are many good tick control products for dogs. Talk to your veterinarian about recommendations and always follow product instructions, as some products might be toxic if used incorrectly. If your pet becomes ill, have your pet examined by a veterinarian and tell them about any recent tick exposure.



Figure 8. The ears of a dog are likely places to find ticks.

MORE INFORMATION

For more information on ticks and tick-borne diseases, contact your local health department. For a list of health departments, visit <http://www.odh.ohio.gov> and click on Local Health Departments.

Additional sources of information on tick-borne diseases can be found at:

Infectious Disease Control Manual, Ohio Department of Health (select disease of interest)
<http://www.odh.ohio.gov/pdf/IDCM/sect3TOC.pdf>

Tick-borne Diseases, Ohio Department of Health
<http://www.odh.ohio.gov/odhPrograms/dis/zoonoses/vbdp/vbtick.aspx>

Tick-borne Diseases in the U.S., Centers for Disease Control and Prevention
<http://www.cdc.gov/ticks/diseases/>

Tick-borne diseases in animals, Center for Food Safety & Public Health, Iowa State University
<http://www.cfsph.iastate.edu/DiseaseInfo/>

References Cited

Centers for Disease Control and Prevention. 2009. **MMWR weekly: Appendix Methods Used for Creating a National Lyme Disease Risk Map**. Retrieved from <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr4807a2.htm>

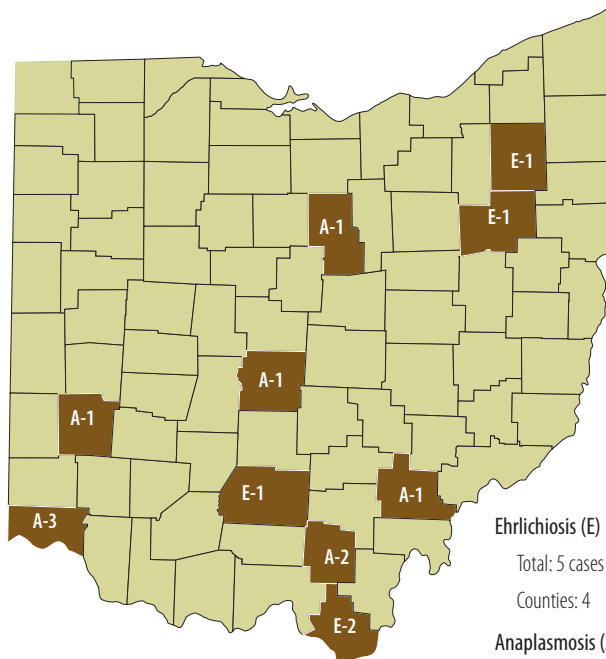
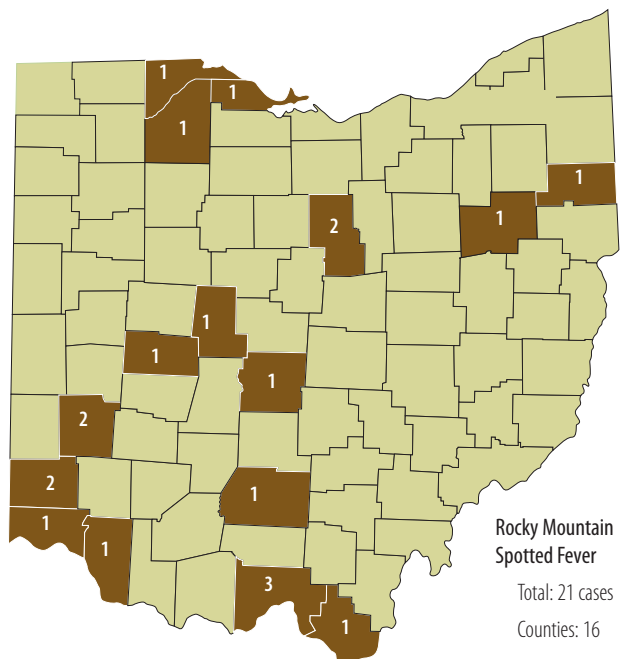
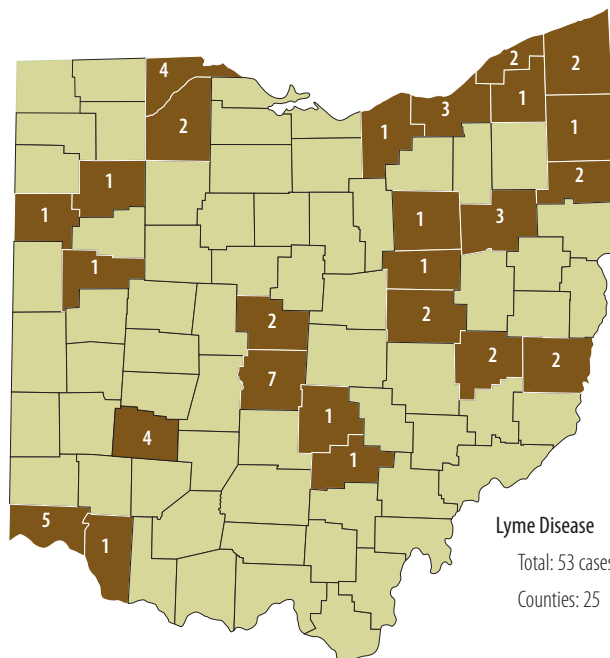
Dennis, D.T., T.S. Nekomoto, J.C. Victor, S.P. William, J. Piesman. 1998. **Reported distribution of *Ixodes scapularis* and *Ixodes pacificus* ticks (Acari: Ixodidae) in the United States**. *J. Med. Entomol.* 35: 629-38.



Appendix A

Human Cases of Reportable Tick-borne Diseases in Ohio, 2011

Includes cases that meet the Centers for Disease Control Prevention case definition as confirmed or probable*



* http://www.cdc.gov/osels/ph_surveillance/nndss/casedef/case_definitions.htm