



Tick-Borne Infections Council
of North Carolina, Inc.

NEWSLETTER 2015, Volume 2



Quote of the season: “The lone star ‘is as common as dirt’...They're aggressive and they attack people in swarms. Often you'll get four or five bites.” -- David Gaines, Virginia public health entomologist, August 2014

Highlights...

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State Vector-Borne Disease Task Force Meeting Schedule

Aug. 14, 2015

Nov. 13, 2015

(Check with us before going to confirm date as they occasionally change.)

Location:

Office of the Chief Medical Examiner Photo ID required.
4312 District Drive
Raleigh, NC 27607

Links to Letters to Medical Providers from the State Department of Public Health on Lyme Disease and Rickettsial Diseases

These links are to the letters the state Department of Public Health issues every year to medical providers on Lyme disease and the Rickettsial diseases such as RMSF:

[2015 Rickettsial Disease Memo](#)

[2015 Lyme Disease Memo](#)

[2015 Arboviral Disease Memo](#)

Disease	Total cases by year of report 2012 Final	Total cases by year of report 2013 Preliminary	Cases between 1/1/14 and 12/31/14
	Confirmed + Probable (Confirmed/Probable/Suspected)	Confirmed + Probable (Confirmed/Probable/Suspected)*	(Probable/Confirmed)**
Lyme disease	122 (27/95/80)	180 (39/141/89)	172 (145/27)
Rickettsioses	591 (12/579/341)	426 (11/415/193)	506 (496/10)
Ehrlichia	105 (18/91/56)	78 (24/54/22)	72 (61/11)
Anaplasma	21 (0/21/21)	15 (1/14/14)	12 (12/0)

*This is the year of report, not year of illness onset

** Illness onset may be prior to 1/1/14

Note: Alleghany and Wilkes Counties now have a second confirmed case of Lyme disease in a person who had not traveled out of the county for 30 days after their tick exposure. **Therefore, these counties are now declared endemic for Lyme disease bringing the total of endemic counties in NC to five (Wake, Guilford, Haywood, Alleghany, and Wilkes)**

Counties with one case of locally acquired Lyme disease: Cleveland (2008), Wilson (2009), Pitt (2009), Carteret (2009), Gates (2011), Perquimans (2011), Rowan (2013), Union (2013), Caldwell (2013), Franklin (2014), Stanley (2014), Duplin (2014).

§§ North Carolina and Southeast Section §§

2014 Legislative Event in N.C. - The Final Elimination of N.C.’s State Aid for Mosquito

The State of North Carolina budget for FY2014-2015 essentially ends a 56-year history of State funding support for local mosquito control programs in N. C. The final eliminated amount for the

entire state was \$185,992... a far cry from the approximate \$1 million appropriated for local programs just 14 years ago(2000). A link to local N.C. community response to this action is listed below. The 'emergence' of imported Chikungunya (CHIK) in the U.S. (<http://www.cdc.gov/Chikungunya/index.html>) has resulted in a number of Mid-Atlantic states making the disease required reportable, by medical practitioners, in their states. NC and WVA implemented this in early June while MD and DE reported, at that time, that discussions with their state communicable disease divisions were continuing on adopting the same requirements.

From Legislative Update by Dennis Salmen, *Biting Times, Newsletter for the North Carolina Mosquito & Vector Control Association*, October, 2014

Bug Fest at the North Carolina Museum of Natural Science in September 2014

The Cub Scouts from Pack 391 under the directions of their leader Steve Cobb gave information and TIC-NC's popular brochure to more than one thousand attendees of the Bug Fest at the North Carolina Museum of Natural Science. The Bug Fest was a great success.

Local 'Lyme Literate' Physician on TV

TV newscast with Dr. Franczak in it. The station is in Raleigh:

<http://abc11.com/health/i-team-controversy-over-lyme-disease-in-north-carolina/153878/>

TIC-NC Board Members Met with Representatives of United Health Care for their Volunteer Day

Liz Craybill, Director of Regulatory Affairs for United Health Care and her colleague Geri Shomo requested a meeting with us, November 2014, to learn more about tick-borne illnesses in NC and to



Joanie Alexander, Susan Walsler, Liz Crabill and Marcia Herman-Giddens, Fearington, Nov. 2014

TIC-NC Talks and Materials Distributed in Fall 2014 to Early 2015

- **Brochures:**
- Location in New Hampshire (on special request)
- Country store, Chatham County
- Entire Middle School in Madison County, NC
- Charlotte Garden Club
- Bug Fest, Raleigh, via Garner Boy Scout Troop
- Pittsboro Animal Hospital
- North Chatham Elementary School
- Numerous vet offices across the state
- Packet sent on request to Maryland
- **Talks:**
- Duke University Adult Learning (OLLI). October 2014
- NC Mosquito and Vector Control Association, Greenville, NC. November 2014
- Audubon Society, Chapel Hill, NC. January 2015

express their interest in assisting with outreach to the medical professionals and general population of the state. They estimated that undiagnosed and untreated tick-borne illnesses as well as treatment of known TBIs might cost tens of thousands if not hundreds of thousands of dollars in claims in NC. We are continuing our contact.

A Paper from North Carolina Scientists on the Bacteria and Its Relatives That Cause Rocky Mountain Spotted Fever and Related Diseases

A seroepidemiologic study of human infections with spotted fever group rickettsiae in North Carolina. Susan Vaughn et al. *Journal of Clinical Microbiology*, September 2014

Increasing entomologic and epidemiologic evidence suggests that spotted fever group rickettsiae (SFGR) other than *Rickettsia rickettsii* are responsible for spotted fever rickettsioses in the US. A retrospective seroepidemiologic study was conducted on stored acute and convalescent sera that had been submitted for Rocky Mountain spotted fever testing to the North Carolina State Laboratory of Public Health. We evaluated the serologic reactivity of the paired sera to *R. rickettsii*, *R. parkeri*, and *R. amblyommii* antigens.

Of the 106 eligible pairs tested, 21 patients seroconverted to one or more antigens. Cross-reactivity to multiple antigens was observed in ten patients and seroconversions to single antigens occurred in 11 patients, including one against *R. rickettsii*, four against *R. parkeri*, and six against *R. amblyommii*. Cross-absorption of cross-reactive sera and/or western blots identified two presumptive cases of infection with *R. parkeri*, two presumptive cases of infection with *R. rickettsii*, and one presumptive case of infection with *R. amblyommii*.

These findings suggest that species of SFGR other than *R. rickettsii* are associated with illness among North Carolina residents and that serologic testing using *R. rickettsii* antigen may miss cases of spotted fever rickettsioses caused by other species of SFGR.

Another NC Paper- *Bartonella* Species in the Blood of Veterinarians

Detection of *Bartonella* Species in the Blood of Veterinarians and Veterinary Technicians: A Newly Recognized Occupational Hazard?

Background: *Bartonella* species are important emerging pathogens in human and veterinary medicine. In the context of their daily activities, veterinary professionals have frequent animal contact and arthropod exposures. Detection of *Bartonella* spp. using traditional culture methods has been limited by poor sensitivity, making it difficult to determine the prevalence of infection in this population. We have developed a detection method combining enrichment culture and molecular amplification, which increases testing sensitivity.

Methods: We performed a cross-sectional study to determine the prevalence of detectable *Bartonella* spp. in the blood of veterinary personnel and nonveterinary control subjects. *Bartonella* was detected by enrichment blood culture with conventional PCR followed by DNA sequencing. Results were correlated with epidemiological variables and symptoms.

Results: We detected DNA from at least one *Bartonella* species in 32 (28%) of the 114 veterinary subjects. After DNA sequencing, the *Bartonella* species could be determined for 27 of the 32 infected subjects, including *B. henselae* in 15 (56%), *B. vinsonii* subsp. *berkhoffii* in seven (26%), *B. koehlerae* in six (22%), and a *B. volans*-like sequence in one (4%). Seventy percent of *Bartonella*-positive subjects described headache compared with 40% of uninfected veterinarians ($p=0.009$). Irritability was also reported more commonly by infected subjects (68% vs. 43%, $p=0.04$).

Conclusions: Our study supports an emerging body of evidence that cryptic *Bartonella* bloodstream infection may be more frequent in humans than previously recognized and may induce symptoms. Longitudinal studies are needed to determine the natural course and clinical features

of *Bartonella* infection.

Lantos P M., Maggi R.G., Ferguson Brandy, Varkey J, Park LP., Breitschwerdt EB., and Woods CW.. Vector-Borne and Zoonotic Diseases. August 2014, 14(8): 563-570. doi:10.1089/vbz.2013.1512.

§§ National Section §§

A Rickettsia Common in Lone Star Ticks Offers Protection Against RMSF in Guinea Pigs

***Rickettsia amblyommii* Induces Cross Protection against Lethal Rocky Mountain Spotted Fever in a Guinea Pig Model**

Rocky Mountain spotted fever (RMSF) is a severe illness caused by *Rickettsia rickettsii* for which there is no available vaccine. We hypothesize that exposure to the highly prevalent, relatively nonpathogenic "*Rickettsia amblyommii*" protects against *R. rickettsii* challenge. To test this hypothesis, guinea pigs were inoculated with "*R. amblyommii*." After inoculation, the animals showed no signs of illness. When later challenged with lethal doses of *R. rickettsii*, those previously exposed to "*R. amblyommii*" remained well, whereas unimmunized controls developed severe illness and died. We conclude that "*R. amblyommii*" induces an immune response that protects from illness and death in the guinea pig model of RMSF. These results provide a basis for exploring the use of low-virulence rickettsiae as a platform to develop live attenuated vaccine candidates to prevent severe rickettsioses. Blanton LS, et al. Vector-Borne and Zoonotic Diseases. August 2014, 14(8): 557-562. doi:10.1089/vbz.2014.1575.

Online Article on Lyme Disease and New Legislation in NY to Protect Treating Providers

A New Front in the Lyme Wars. December 15th (2014), without much ceremony or public comment, Governor Andrew Cuomo signed a law that has the potential to change the way medicine in New York is practiced. Frequently referred to as the Lyme Doctor Protection Act, the law prohibits the state board of medicine from investigating complaints of substandard care "based solely on their recommendation or provision of treatment modality that is currently not universally accepted by the medical profession." Entire article by Michael Specter at:

<http://www.newyorker.com/news/daily-comment/new-front-lyme-wars>

TIC-NC Ed note: Mr. Specter recognizes both the difficulties and unknown issues in treating patients with or without co-infections and need for doctors to not be censured for stepping outside the Infectious Disease Society of America guidelines, but also says this new legislation "can be interpreted as a license to be a witch doctor." An amendment may be added in 2015. See: Governor Cuomo signed the Lyme doctor protection bill into law in NY. The legislature and Governor have agreed to some kind of amendment, however, and that amendment has not yet been made public.

<http://open.nysenate.gov/legislation/bill/S7854-2013>

From Virginia: Newport News, Hampton Residents Report High Rate of Exposure and Disease

Responses to an Old Dominion University survey on the region's health listed exposure to tick bites as an important health concern. Almost one in three Newport News households, including people and pets, reported substantial exposure to ticks, and more than one in five Hampton households reported tick encounters.



"It was pretty startling how many people have had tick encounters," said Jesse Richman, faculty director of ODU's Social Science Research Center, which conducted the survey. He attributed the disparity in reports between the Peninsula and much lower incidence in Norfolk and

Virginia Beach to the size of the white-tail deer population in the different locales.

The telephone survey of 853 people, part of ODU's 2014 Life in Hampton Roads report, was released Wednesday. Holly Gaff, associate professor of biology, said the numbers underlined "a stunning degree" of under-reporting of tick bites in state and national health estimates.

According to the survey, 3.6 percent of respondents had suffered from a tick-borne disease, with a large number having occurred in the past year.

August 20, 2014|By Prue Salasky, psalasky@dailypress.com For entire article see:

http://articles.dailypress.com/2014-08-20/health/dp-nws-odu-ticks-20140820_1_lyme-disease-tick-bites-infected-deer-tick

New Standard of Care Guidelines for Treating Lyme and Other Tick-borne Illnesses Released by International Lyme and Associated Diseases Society (ILADS)

Bethesda, Maryland, July 31, 2014

The International Lyme and Associated Diseases Society (ILADS) today released updated guidelines for the treatment of Lyme and other tick borne infections which call on physicians to provide evidence-based, patient-centered care for those with Lyme disease.

Published in the August 2014 edition of the journal *Expert Review of Anti-infective Therapy*, the new guidelines, titled: *Evidence Assessments and Guideline Recommendations in Lyme disease: The Clinical Management of Known Tick Bites, Erythema Migrans Rashes and Persistent Disease*, say current antibiotic protocols used by many physicians to prevent or treat Lyme disease are inadequate, leading to an increased risk of Lyme disease developing into a chronic illness.

ILADS is the first organization to issue guidelines on Lyme disease which comply with the standards set by the Institute of Medicine for developing trustworthy protocols. The document provides a rigorous review of the pertinent medical literature and contains recommendations for Lyme disease treatment based on the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) process. This review format is used by other well-respected medical organizations including the Cochrane Collaboration and the World Health Organization.

Link to paper with the new guidelines:

<http://informahealthcare.com/doi/pdf/10.1586/14787210.2014.940900> The paper is open-access, so available to anyone.

The Relationship Between Deer Density, Tick Abundance, and Human Cases of Lyme Disease in a Residential Community

White-tailed deer (*Odocoileus virginianus* Zimmerman), serve as the primary host for the adult blacklegged tick (*Ixodes scapularis* Say), the vector for Lyme disease, human babesiosis, and human granulocytic anaplasmosis. Our objective was to evaluate the degree of association between deer density, tick abundance, and human cases of Lyme disease in one Connecticut community over a 13-yr period. We surveyed 90–98% of all permanent residents in the community six times from 1995 to 2008 to document resident's exposure to tick-related disease and frequency and abundance of deer observations. After hunts were initiated, number and frequency of deer observations in the community were greatly reduced as were resident-reported cases of Lyme disease. Number of resident-reported cases of Lyme disease per 100 households was strongly correlated to deer density in the community.

Reducing deer density to 5.1 deer per square kilometer resulted in a 76% reduction in tick abundance, 70% reduction in the entomological risk index, and 80% reduction in resident-reported cases of Lyme disease in the community from before to after a hunt was initiated. (Our italics) H. J. Kilpatrick et al. J Med Entomol. 2014 Jul;51(4):777-84.

Lyme Disease Research Bill Cleared US House in September

The bill, which passed unanimously through the House in a voice-vote in early September 2014, would be the first federal law of its kind. It is now in the hands of the Senate. The legislation, crafted by U.S. Rep. Chris Smith, will confront what Smith referred to as “gaps in health treatment,” that exist in a medical climate where Lyme is not always acknowledged in a uniform way. According to a Sept. 9 press release from the congressman’s office, the bill will create an inter-agency working group on Lyme disease and strategically guide existing federal research and treatment programs. Excerpted from Kira Buxton September 10, 2014.

Read More: [Breakthrough Lyme Disease research bill clears house](http://nj1015.com/breakthrough-lyme-disease-research-bill-clears-house/?trackback=tsmclip) | <http://nj1015.com/breakthrough-lyme-disease-research-bill-clears-house/?trackback=tsmclip>

Developing a Better Test for Lyme Disease Diagnosis

Western Connecticut Health Network Biomedical Research Institute Partnership With RareCyte To Improve Lyme Disease Testing Wins NIAID SBIR Research Grant

The goal of finding a more effective test to diagnose Lyme disease may be closer to reality with a two-year, \$600,000 grant from the National Institute of Allergy and Infectious Disease (NIAID) Small Business Innovation Research Program (SBIR) awarded to RareCyte, Inc. in collaboration with researchers from the Western Connecticut Biomedical Research Institute. Lyme disease, a tick-borne infection caused by the spirochete *Borrelia burgdorferi*, has expanded to an estimated 300,000 US cases per year with many communities calling it a public health imperative. Currently as many as half of those approved tests of immune response are sub-optimal and often give negative results early in the disease causing painful delays in treatment and even misdiagnosis. Better testing will enable earlier detection - and hence better treatment - of Lyme disease. Paul N. Fiedler, M.D. Chairman, Department of Pathology and Laboratory Medicine. August 06, 2014 - Danbury, CT



Lyme Activists Protest in Front of the New York Times

Sept. 17, 2014 The weather was as congenial as the mood today, as over 100 Lyme activists convened in front of the *New York Times* building to call attention to the lack of media coverage of the Lyme pandemic. The black clad protesters came from New York and other states around the country, to wear green armbands, light candles and carry signs. For whole story:

<http://www.lymedisease.org/nyt-lyme-protest-summary-2/>

The Climate Change Community Follows Lyme Disease

As Lyme disease spreads in the U.S., those in its path cope with a debilitating, bewildering array of maladies, misery and afflictions.

Richard Gardiner had no option but to shut down his law practice in Fairfax, Va. in the summer of 2012. A fit 60 year-old, he came down with a high fever and the worst chills he had known in his life. He spent a miserable summer bedridden with aches and debilitating fatigue. At around the same time in Bozeman, Mont., 12-year-old Noelle Freeburg – described by her mother as a "healthy-as-a-horse" tween who enjoyed dancing, swimming and skiing – became feverish, dizzy, and doubled over with stomach aches every time she tried to exert herself.

In different corners of the United States, this middle-aged man and middle school girl were embarking on the same frustrating, costly journey. It took both of them months to learn why their health was deteriorating. They were patients on the frontiers of North America's expanding Lyme disease epidemic. For rest of story: <http://www.dailyclimate.org/tdc-newsroom/2014/09/us-lyme-disease>. Marianne Lavelle *The Daily Climate* September 22, 2014

Research Using Lyme Disease Infected Ticks on Human to See if the Disease Is Transmitted (called Xenodiagnosis)

Is there a place for xenodiagnosis in the clinic?

Whether *Borrelia burgdorferi*, the causative agent of Lyme disease, can persist after antibiotic therapy is an area of ongoing controversy. In animal models, *B. burgdorferi* DNA can be detected in tissues after antibiotic therapy as well as by using the natural tick vector to acquire the organism through feeding (xenodiagnosis). Vector arthropods have been successfully used in xenodiagnosis to describe the etiology of infections such as malaria, typhus and Chagas disease. Our recent safety trial of xenodiagnosis demonstrates that ticks may be successfully fed on patients and may help determine the biological basis for post-treatment Lyme disease syndrome. Entire paper:

<http://informahealthcare.com/doi/pdf/10.1586/14787210.2014.966084> November 2014, Vol. 12, No. 11, Pages 1307-1310 (doi:10.1586/14787210.2014.966084)

Sam R Telford, Linden T Hu, and Adriana Marques

Tick Map – An Interesting Tool

TickMap is a product of the Walter Reed Biosystematics Unit based in the Smithsonian Institution (see link for WRBU above). TickMap is a geospatially referenced clearinghouse for tick disease vector species collection records and distribution models within VectorMap. Users can pan and zoom to anywhere in the world to view the locations of past tick collections and the results of modeling that predicts the geographic extent of individual species. Collection records are searchable and downloadable, users can map and contribute their own georeferenced collection data or distribution models, and all contributions have full attribution. Go to: <http://www.vectormap.org/tick.htm>

The Genome Sequence of Lone Star Virus

Abstract: Viruses in the family Bunyaviridae infect a wide range of plant, insect, and animal hosts. Tick-borne bunyaviruses in the Phlebovirus genus, including Severe Fever with Thrombocytopenia Syndrome virus (SFTSV) in China, Heartland virus (HRTV) in the United States, and Bhanja virus in Eurasia and Africa have been associated with acute febrile illness in humans. Here we sought to characterize the growth characteristics and genome of Lone Star virus (LSV), an unclassified bunyavirus originally isolated from the lone star tick *Amblyomma americanum*. Although LSV had remained genetically uncharacterized for more than 40 years, our interest in it was piqued because exposure to the *A. americanum* tick has been associated with an illness of unknown etiology called Southern Tick-borne Rash Illness (STARI) [15,16,17,18], a condition that is similar clinically to early Lyme disease. We wished to characterize LSV so that we could develop appropriate diagnostic tools to evaluate whether this virus could be found in clinical specimens from STARI patients. Swei A, Russell BJ, Naccache SN, Kabre B, Veeraraghavan N, et al. (2013) The Genome Sequence of Lone Star Virus, a Highly Divergent Bunyavirus Found in the *Amblyomma americanum* Tick. *PLoS ONE* 8(4): e62083. doi:10.1371/journal.pone.0062083

Federal Initiative: Tick-Borne Disease Integrated Pest Management White Paper

“Tick-borne diseases (TBDs) affect tens of thousands of Americans each year, afflicting them with serious illness that causes significant morbidity and sometimes mortality. Integrated Pest Management (IPM) of ticks that bite humans is an important part of preventing TBDs.”

The entire document, co-authored by Charles Ben Beard, Ph.D, Centers for Disease Control and Prevention, and Daniel Strickman, Ph.D., US Department of Agriculture is available at:

<http://www.epa.gov/pestwise/ticks/tick-ipm-whitepaper.pdf>

PLEASE Study in the Netherlands – Looking at Whether Longer Antibiotic Treatment May Help for Lyme Disease

The PLEASE study is designed to determine whether prolonged antibiotic treatment leads to better patient outcome than standard treatment. The incidence of Lyme disease in the Netherlands has been increasing, as has the number of patients with persistent symptoms attributed to *Borrelia*. These symptoms, also referred to as post-Lyme disease syndrome, may follow an erythema migrans or other Lyme manifestations, and include pain, fatigue, and cognitive disturbances. The optimal duration of treatment for these symptoms is a subject of controversy. For entire paper see: [Persistent Lyme Empiric Antibiotic Study Europe \(PLEASE\)-design of a randomized controlled trial of prolonged](#)

Feeding Period Required by *Amblyomma aureolatum* Ticks for Transmission of *Rickettsia rickettsii* to Vertebrate Hosts

Rocky Mountain spotted fever is endemic to the São Paulo metropolitan area, Brazil, where the etiologic agent, *Rickettsia rickettsii*, is transmitted to humans by adult *Amblyomma aureolatum* ticks. We determined the minimal feeding period required by *A. aureolatum* nymphs and adults to transmit *R. rickettsii* to guinea pigs. Unfed nymphs and unfed adult ticks had to be attached to the host for >10 hours to transmit *R. rickettsii*. In contrast, fed ticks needed a minimum of 10 minutes of attachment to transmit *R. rickettsii* to hosts. Most confirmed infections of Rocky Mountain spotted fever in humans in the São Paulo metropolitan area have been associated with contact with domestic dogs, the main host of *A. aureolatum* adult ticks. The typical expectation that transmission of tickborne bacteria to humans as well as to dogs requires ≥ 2 hours of tick attachment may discourage persons from immediately removing them and result in transmission of this lethal bacterium.

Saraiva DG, Soares HS, Soares JF, Labruna MB. Feeding period required by *Amblyomma aureolatum* ticks for transmission of *Rickettsia rickettsii* to vertebrate hosts. *Emerg Infect Dis*. 2014 Sep [date cited]. <http://dx.doi.org/10.3201/eid2009.140189>

The European Lyme Disease Transmitting Tick (*I. ricinus*) is Now at Higher Elevations

Range expansion of *Ixodes ricinus* to higher altitude, and co-infestation of small rodents with *Dermacentor marginatus* in the Northern Apennines, Italy

Immature ticks (*Ixodes ricinus* and *Dermacentor marginatus*) were collected from small rodents (*Apodemus* spp. and *Myodes glareolus*), in the Northern Apennines, Italy, at an altitude up to 1650 m above sea level (a.s.l.), from 2009 through 2012. While *D. marginatus* had been found at the same location in studies carried out in 1994, *I. ricinus* was very rare or absent. Prevalence (95% confidence interval) of infestation by *I. ricinus* larvae on *Apodemus* spp. was 54.4% (47.5, 61.2), and it was greater than prevalence of *D. marginatus* larvae on the same hosts (23.3%, 17.8, 29.5). The mean (standard deviation) numbers of *I. ricinus* and *D. marginatus* larvae per individual *Apodemus* spp. were similar: 2.3 (4.1) and 2.1 (9.8), respectively. The monthly infestation pattern of the two tick species on *Apodemus* spp. were different. *I. ricinus* larvae were more frequent in June and September, than in July–August. *I. ricinus* nymphs were generally rare, and were most frequently found in July. The prevalence of *D. marginatus* larvae peaked in July–August, whereas nymphs were mostly active in August–September. Increasing population densities of roe deer (*Capreolus capreolus*), and increasing temperatures, in the last decades, in the Apennine area might have contributed to the observed range expansion of *I. ricinus*. E Martello, et al. *Ticks and Tick-borne Diseases*, 2014

New Repellants Researched

Field Evaluations of Topical Arthropod Repellents in North, Central, and South America

Recently, vector-borne diseases have been resurging in endemic areas and expanding their geographic range into nonendemic areas. Such changes have refocused attention to the potential for major public

health events, as naïve populations are exposed to these pathogens. Personal topical repellents, recommended by the United States Centers for Disease Control and Prevention and World Health Organization, remain a first line of protection against infection. The current study evaluated the repellent efficacy of four new U.S. Environmental Protection Agency-registered topical repellent products, two with picaridin as the active ingredient and two with IR3535, against a standard DEET (*N,N*-diethyl-3-methylbenzamide)-based product. All products were evaluated against a wide range of vector species under field conditions across the Americas. Human volunteers were used to evaluate product efficacy as compared with a well-known DEET-based formulation and determine suitability for use by the U.S. military. Findings demonstrated the new formulations performed as well as the standard U.S. military repellent and could be recommended for use.

Kendra L. Lawrence, et al. *Journal of Medical Entomology* 51(5):980-988. 2014
doi: <http://dx.doi.org/10.1603/ME14075>

Black-legged Tick, Lyme Disease Vector, Spreads to North Dakota

Survey of Ticks (Acari: Ixodidae) and Tick-Borne Pathogens in North Dakota

Ticks were sampled at nine locations throughout North Dakota during early summer of 2010, using flagging techniques and small mammals trapping. In total, 1,762 ticks were collected from eight of the nine locations. The dominant species were *Dermacentor variabilis* (Say) (82%), found throughout the state, and *Ixodes scapularis* Say (17%), found in northeastern counties. A few nymphal and adult *I. scapularis* tested positive for *Borrelia burgdorferi* (3%) and *Anaplasma phagocytophilum* (8%). This is the first report of *I. scapularis* and associated pathogens occurring in North Dakota and provides evidence for continued westward expansion of this important vector tick species in the United States. *Journal of Medical Entomology* 51(5):1087-1090. 2014, Russart NM et al.

doi: <http://dx.doi.org/10.1603/ME14053>

Lone Star Ticks in Canada, and Black-legged Ticks are Increasing Along with their Infection Rate with the Lyme Disease Bacteria

Population-Based Passive Tick Surveillance and Detection of Expanding Foci of Blacklegged Ticks *Ixodes scapularis* and the Lyme Disease Agent *Borrelia burgdorferi* in Ontario, Canada

Among the 18 species of ticks identified, *I. scapularis*, *Dermacentor variabilis*, *Ixodes cookei* and *Amblyomma americanum* (the lone star) represented 98.1% of the 14,369 ticks submitted. Ticks were collected from 2008 to 2012. The infection prevalence of *B. burgdorferi* in blacklegged ticks increased in Ontario over the study period from 8.4% in 2008 to 19.1% in 2012. The prevalence of *B. burgdorferi*-positive blacklegged ticks increased yearly during the surveillance period and, while increases were not uniform across all regions, increases were greatest in the Central West region, followed by Eastern and South West regions. The overall infection prevalence of *A. phagocytophilum* in blacklegged ticks was 0.3%.

Nelder MP, Russell C, Lindsay LR, Dhar B, Patel SN, et al. (2014) Population-Based Passive Tick Surveillance and Detection of Expanding Foci of Blacklegged Ticks *Ixodes scapularis* and the Lyme Disease Agent *Borrelia burgdorferi* in Ontario, Canada. *PLoS ONE* 9(8): e105358.
doi:10.1371/journal.pone.0105358

Possoms Groom Themselves Well Against Ticks

Possoms, like many other mammals, are hosts for ticks looking for a blood meal but are very efficient at removing ticks. For entire story see:

<http://www.caryinstitute.org/discover-ecology/podcasts/why-you-should-brake-possums>

Don't Get a Tick in Your Ear Canal!

Efficacy of Common Reagents for Killing Ticks in the Ear Canal

Objectives: Determine if widely available solutions can effectively kill ticks that may be found in the human ear canal.

Methods: This study was prospective, controlled, and blinded. Lone star ticks (*Amblyomma americanum*), both nymphal and adult, were submerged in 1 of 4 preparations in test tubes (20/group) for 20 minutes. Ticks were agitated by intermittent probing. Activity of adult ticks was video-recorded during the exposure period. A blinded investigator viewed the videos of adult ticks and directly observed the nymphal ticks during the exposure period to determine the time until death (i.e., movement cessation). Mortality was assessed immediately after exposure, and confirmed 24 and 48 hours after exposure.

Results: Acetone killed ticks most rapidly (nymph mean time, 185.1 s; adult mean, 562.9 s). Isopropanol 70% (nymphs, 328.9 s; adults, 1128.4 s) and ethanol 95% (nymphs, 294.0 s; adults, 1129.4 s) took longer to kill the ticks. All ticks treated with 4% lidocaine survived. These differences were significant (nymphs, $P < .0001$; adults, $P < .0001$).

Conclusions: Acetone is the most effective of the tested, commonly available solutions to kill ticks in the ear canal.

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