In a recent study conducted in central Pennsylvania, evidence of emerging pathogens, some also common to ticks, have been found in fleas. Various pathogens can be spread by ectoparasites among animal host populations in nature. Along with ticks, fleas are found to commonly infest small mammals. The role of pathogen transmission cycles for these vectors is unknown.

In this study, small mammals were captured and fleas were collected in an effort to better understand the enzootic cycle of flea-borne pathogens in central Pennsylvania. Pathogen testing was conducted in both the small mammal hosts and the fleas collected.

Seven species of small mammals were captured of which white-footed mice (*Peromyscus leucopus*) and southern red-backed voles (*Myodes gapperi*) accounted for over 94% of the captures. Only *P. leucopus* tested positive for the blood-borne pathogens examined, with 47 (18.1%) positive for *Anaplasma phagocytophilum* and ten (4.8%) positive for *Babesia microti*.

Of the 61 fleas collected from small mammals and tested for pathogens, *Orchopeas leucopus* was the most common flea species.
species. Pathogenic bacteria and parasites were detected in 33.3% of total fleas collected, and included *Bartonella vinsonii* subspecies *arupensis*, *B. microti*, and a *Rickettsia felis*-like bacterium. Researchers believe this to be the first report of *B. microti* DNA detected from a flea, as well as the first report of a *R. felis*-like bacterium from rodent fleas in eastern North America.

At this time, only plague (*Yersinia pestis*) is a nationally reportable flea-borne disease in the United States. Like tick-borne diseases, under-reporting of flea-borne illnesses limits understanding of the burden of disease from these vectors. The potential for new and re-emerging pathogens in fleas as well as the potential for fleas to play a role in natural transmission cycles of tick-borne pathogens is not understood. This study elucidates that further investigation is needed to understand the ecology of flea-borne disease transmission cycles, vector competence of fleas for tick-borne pathogens, and the risk to human health.

Read full article: [Host distribution and pathogen infection of fleas (Siphonaptera) recovered from small mammals in Pennsylvania](#)

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**Asian Longhorned Tick Continues to Multiply, Can**
transmit to Animals in the Lab

These pictures of the *Haemaphysalis longicornis* (Asian longhorned) were taken recently by LDA’s Scientific & Professional Advisory Board member James L. Occi, Rutgers, in Bergen County NJ. The invasive tick was first discovered on a NJ farm on a sheep in 2017. The tick probably came from Asia, where it is able to transmit diseases to cattle, other animals, and to humans and is now found in 12 states. One of the greatest concerns is about its parthenogenetic ability, the female reproduces without the male. This enables the tick to quickly become an established species in an area. It has already killed cattle in a couple states where more than a thousand ticks were found on each of the deceased animals.
To date, the Asian longhorned tick has been found in the laboratory to be able to acquire and transmit *Rickettsia rickettsii*, the agent of Rocky Mountain spotted fever (RMSF) and was also found to be able to transmit *R. rickettsii* through the ova (Stanley et al, 2020).* The Asian longhorned tick has not been found to transmit to humans outside the lab at this time in North America.

However, we need to be cautious, since until several years ago, the government indicated that brown dog ticks only fed upon dogs, not people. Therefore humans did not have to worry about getting RMSF from a brown dog tick. Now we know that human transmission is happening from the brown dog tick, since we know they are biting humans, especially in the Southwest.

*https://academic.oup.com/jme/article/doi/10.1093/jme/tjaa076/5822589*


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**Current Lyme Disease Testing**
Problems

Elizabeth Maloney, MD, explains current Lyme disease testing issues, including the ELISA and Western Blot, sensitivity and specificity of the testing, and the problems associated with the two-tier testing recommended by the CDC. It begins with the general characteristics of diagnostic testing.

The Summary states: “Seroologic testing for Lyme is inaccurate. While the inadequate sensitivity of ELISA and Western blot tests is the primary problem, imprecision and the lack of clinical validity contribute to the poor performance of two-tier testing in clinical settings. Although the high specificity of the CDC two-tier strategy works well for epidemiologic purposes, the testing sequence reduces the overall sensitivity, thereby limiting its clinical effectiveness. While positive results on two-tier testing in an untreated patient who has symptoms of Lyme disease would confirm the clinical diagnosis (and it would be a mistake to label such results as “false positives”), negative results do not rule out Lyme disease.”

See full article by Elizabeth Maloney, MD here: Applying Basic Concepts in Laboratory Testing to Serologic Testing for Lyme Disease

See International Lyme & Associated Diseases (ILADS) Controversy & Challenges Page – Issues with Diagnosis & Diagnostics
The NIH Strategic Plan for Tickborne Disease Research, October 9, 2019, is good news for everyone in the Lyme and tick-borne diseases community! The plan builds on the activities of the Department of Health and Human Services Tick-Borne Disease Working Group (TBDWG), which issued a 2018 report to Congress outlining research recommendations. Through inventories sent to government agencies to determine gaps in their research on tick-borne diseases (TBD), the Working Group uncovered the fact that NIH did not have a national strategy for TBD. The HHS TBDWG Report made the recommendation below in the November 2018 report:

**Recommendation 8.1:** NIH: Create an NIH tick-borne disease
The Lyme Disease Association submitted input to the NIH on a strategy:


The newly released NIH plan focuses on five scientific priorities important for advancing research and development over the next five years.

1. Improving fundamental knowledge of tickborne diseases, including the biology of tickborne pathogens; how they are transmitted to humans, evade the immune system, and spread within the body. Including determining the cause of persistent symptoms in some people infected with tickborne diseases, such as Lyme disease, and furthering the understanding of how tick-derived factors contribute to the establishment and severity of disease.

2. Advance research to improve detection and diagnosis of TBDs. Improving detection and diagnosis of tickborne diseases by developing rapid diagnostic tests that can
detect a pathogen both early and late in infection and distinguish between active and past infections. NIH will support the development of diagnostics capable of predicting treatment success and identifying human biomarkers of infection and persistent symptoms.

3. Accelerate research to improve prevention of TBDs. The new plan also prioritizes the acceleration of research designed to prevent tickborne disease infection, including vaccines, and immune-based treatments, as well as strategies to reduce the transmission of tickborne pathogens to animal populations that serve as hosts.

4. Focusing on research to develop new treatments for tickborne diseases and techniques to reduce disease complications.

5. Prioritizing the development of tools and resources to advance tickborne disease research by improving scientists’ access to biological samples, tickborne disease genetic data, and supporting preclinical development of promising products.

NIH intends to expand collaborations across its institutes and centers to promote a multidisciplinary approach to tickborne disease research, answer complex biological questions and encourage the application of state-of-the-art technologies used successfully in a range of scientific disciplines.

NIH Strategic Plan for Tickborne Disease Research

NIH Strategic Plan News Release

Congressman Smith praises NIH announcement (TAPinto.net)

Congressman Smith press release on NIH Strategy

Note from LDA: tick-borne disease is generally spelled with a hyphen. NIH has chosen to leave out the hyphen in its report.
LDA Celebrates 50!

In 2018, Lyme Disease Association Inc. (LDA) reached a milestone in its Lyme research support—the 50th journal article with LDA supported research was published. Articles found in 39 different journals begin in 1996 with the ground-breaking, *Borrelia burgdorferi* DNA in the Urine of Treated Patients with Chronic Lyme Disease Symptoms: A PCR Study of 97 Cases, by the late Manfred Bayer in the journal Infection.

Journals range from *The Proceedings of the National Academy of Science, Neurology, Genetics, Gene, Emerging Infectious Diseases, Journal of the American Medical Association, Biochemistry, Veterinary Sciences, Clinical Infectious Disease, Journal of International Neuropsychological Society* to the most recent, *Ticks and Tick-Borne Diseases*.

Researchers funded include, Drs. Ying Zhang, Brian Fallon, Ed Breitschwerdt, Steven Schutzer, Travis Taylor, Eva Sapi, Kerry Clark, Ben Luft and many more from across the U.S.

Other ground-breaking studies include:

- **The Underdiagnosis of Neuropsychiatric Lyme Disease in Children and Adults.**
- **A randomized, placebo-controlled trial of repeated IV antibiotic therapy for Lyme encephalopathy.**
- **Whole-Genome Sequences of Thirteen Isolates of *Borrelia burgdorferi*.**
- **Absence of *Borrelia Burgdorferi*-specific immune complexes in chronic fatigue syndrome.**
- **A Drug Combination Screen Identifies Drugs Active**
against Amoxicillin-Induced Round Bodies of in Vitro Borrelia burgdorferi Persisters from an FDA Drug Library.

- Characterization of Biofilm Formation by Borrelia burgdorferi In Vitro.
- Borrelia Burgdorferi–Specific Immune Complexes in Acute Lyme Disease.
- A Controlled Study of Cognitive Deficits in Children with Chronic Lyme Disease.
- Severity of Lyme disease with persistent symptoms: Insights from a double-blind placebo-controlled clinical trial.
- Distinct Cerebrospinal Fluid Proteomes Differentiate Post-Treatment Lyme Disease from Chronic Fatigue Syndrome.
- Regional prevalences of Borrelia burgdorferi, Borrelia bissettiae, and Bartonella henselae in Ixodes affinis, Ixodes pacificus and Ixodes scapularis in the USA.

Click here to link to all 50!

Other

They are many articles published by people outside the field such as reporters and patients that may be of interest to those researching Lyme disease. Experiences with OCD
There are articles that are published on Lyme disease which are not published in journals which are subject to peer review process but which, nonetheless, are valuable tools for anyone interested in the disease. They may be written by doctors, scientists, government officials, advocates, others considered experts in the field.

**The Effects of Lyme Disease on Students, Schools & School Policy**

You Can Make a Difference to a Child by Reducing Risk of Lyme Disease  
by: Network to Reduce Lyme Disease in School-Aged Children (includes the EPA, CDC, LDA)  
*NASN School Nurse. 2010; 25: 110-113*  
nas.sagepub.com/cgi/reprint/25/3/110 (leaving the LDA website)

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**Peer Reviewed Science**

**Peer Reviewed Medical & Scientific Articles**

These articles carry the most scientific weight as they are reviewed by a committee of doctors and scientists before they are accepted for publication.

The following links are provided for you to other sites which have lists of scientific publications on Lyme disease where you can search for particular aspects of the disease. Sorry, but LDA does not have staff to help you search. You are
leaving the LDA website by clicking on these links.

**PubMed/Medline Search**

PubMed was developed by the [National Center for Biotechnology Information (NCBI)](https://www.ncbi.nlm.nih.gov) at the [National Library of Medicine (NLM)](https://www.nlm.nih.gov), located at the [National Institutes of Health (NIH)](https://www.nih.gov). The PubMed database was developed in conjunction with publishers of biomedical literature as a search tool for accessing literature citations and linking to full-text journal articles at web sites of participating publishers. For more information please refer to the [PubMed overview](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4198384/)

**The Lyme Disease Network Medical/Scientific Literature Database**

This database was developed by the Lyme Disease Network of New Jersey (Lymenet), an LDA affiliate.

[http://search.lymenet.org/](http://search.lymenet.org/)

**Complete Peer Reviewed Articles — Printed with Permission**

[Genomes unblock borrelia’s secrets — New Lyme Disease Findings!](http://lymenet.org/)

Mixed Strains Improve Lyme WB Sensitivity

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**Bransfield Article on Neuropsychiatric Lyme**

Published
Robert C. Bransfield, MD, Department of Psychiatry, Rutgers-RWJ Medical School, published an article on 8-25-18, which demonstrates an association between Lyme borreliosis and neuropsychiatric impairments — considered a major advance in psychiatry. Entitled *Neuropsychiatric Lyme Borreliosis: An Overview with a Focus on a Specialty Psychiatrist’s Clinical Practice*, the article was published in a special issue of *Healthcare – Lyme Disease: The Role of Big Data, Companion Diagnostics and Precision Medicine*, with guest editor, Raphael B. Stricker, MD.

According to Dr. Bransfield, “Lyme borreliosis, possibly with other interactive infections in the body can evade and suppress the immune system and cause immune effects and biochemical changes in the brain causing neuropsychiatric symptoms.” The results can include developmental disorders, autism spectrum disorders, schizoaffective disorders, bipolar disorder, depression, anxiety disorders (panic disorder,
social anxiety disorder, generalized anxiety disorder, post-traumatic stress disorder, intrusive symptoms), eating disorders, sleep disorders, decreased libido, addiction, opioid addiction, cognitive impairments, dementia, seizure disorders, suicide, violence, anhedonia, depersonalization, dissociative episodes, derealization and other impairments.

Dr. Bransfield is a member of the Lyme Disease Association’s Scientific & Professional Advisory Board.

Abstract:

There is increasing evidence and recognition that Lyme borreliosis (LB) causes mental symptoms. This article draws from databases, search engines and clinical experience to review current information on LB. LB causes immune and metabolic effects that result in a gradually developing spectrum of neuropsychiatric symptoms, usually presenting with significant comorbidity which may include developmental disorders, autism spectrum disorders, schizoaffective disorders, bipolar disorder, depression, anxiety disorders (panic disorder, social anxiety disorder, generalized anxiety disorder, posttraumatic stress disorder, intrusive symptoms), eating disorders, decreased libido, sleep disorders, addiction, opioid addiction, cognitive impairments, dementia, seizure disorders, suicide, violence, anhedonia, depersonalization, dissociative episodes, derealization and other impairments. Screening assessment followed by a thorough history, comprehensive psychiatric clinical exam, review of systems, mental status exam, neurological exam and physical exam relevant to the patient’s complaints and findings with clinical judgment, pattern recognition and knowledgeable interpretation of laboratory findings facilitates diagnosis. Psychotropics and antibiotics may help improve functioning and prevent further disease progression. Awareness of the association between LB and neuropsychiatric impairments and studies of their prevalence in neuropsychiatric conditions can improve understanding of the causes of mental illness and
violence and result in more effective prevention, diagnosis and treatment.

Click here for full journal article