

Further evidence of *Borrelia burgdorferi* sensu stricto associated with Lyme disease in the South

Monday, December 19, 2016

<https://danielcameronmd.com/evidence-borrelia-burgdorferi-sensu-stricto-associated-lyme-disease-south/>

Questing black-legged ticks (*I. scapularis*) associated with Lyme disease (LD) were collected at several locations on the Outer Banks of North Carolina between 1991 and 2009. The authors found that in October 1991, *Borrelia burgdorferi*-infected *I. scapularis* ticks were detected at 50% of the sites (four of the eight). “The spirochetes were consistently detected in questing adult ticks at the site in collections made during an 18-year period,” explains Levine, from the College of Veterinary Medicine, North Carolina State University. [2]

The North Carolina investigators went to great lengths to verify the identity of *B. burgdorferi* sensu stricto cases. “The 16 isolates that we sequenced had 98–99% homology with *B. burgdorferi* sensu stricto,” states Levine. *B. burgdorferi* sensu stricto was isolated from rodents including rice rats (*Oryzomys palustris*), white-footed mice (*Peromyscus leucopus*), and marsh rabbits (*Sylvilagus palustris*).

In their article entitled "[Stable Transmission of *Borrelia burgdorferi* Senu Stricto on the Outer Banks of North Carolina.](#)" investigators described both northern/Midwestern and southern *I. scapularis* haplotypes. (A *haplotype* is a group of genes within an organism that was inherited together from a single parent.) One group of haplotypes has been associated with antibiotic-refractory Lyme arthritis. [3]

Levine and colleagues also identified three strains, B31, JD1 and M11p, using advanced sequencing technology. The *Borrelia burgdorferi* sensu stricto has been shown to predict the capacity for hematogenous dissemination during early LD. [4]

The investigators warn readers of the importance of knowing there are *Borrelia burgdorferi*-infected *I. scapularis* ticks in the south. The authors point out that “a path through the sanctuary is a routine route for recreational walking, jogging and bird viewing; both are activities that pose a potential risk of seasonal human exposure to *B. burgdorferi*-infected questing ticks.” [2]

Other studies have reported *B. burgdorferi* sensu stricto in the Southeastern USA, as well, with more than 12 genospecies identified, explains Levine. In his review of three papers, [5-7] he points out “Oliver et al. [8] have also documented the role that other species of ticks and hosts may play in the maintenance of *B. burgdorferi* transmission, as well as other genospecies of *Borrelia* in the Southeast.”

As Rudenko and colleagues point out, the Carolina Wren bird has the potential to move these ticks throughout the south. Rudenko identified “genetically diverse strains of *Borrelia* in individual *I. minor* [a tick species] that fed on a single Carolina Wren (*Thryothorus ludovicianus*).”[9]

Levine and colleagues are to be congratulated on a well-designed study indicating that *Borrelia burgdorferi* sensu stricto is endemic in questing *I. scapularis* and mammalian tick hosts in the southeastern USA.

References:

1. Masters EJ, Grigery CN, Masters RW. STARI, or Masters disease: Lone Star tick-vectored Lyme-like illness. *Infectious disease clinics of North America*. 2008;22(2):361-376, viii.
2. Levine JF, Apperson CS, Levin M, et al. Stable Transmission of *Borrelia burgdorferi* Sensu Stricto on the Outer Banks of North Carolina. *Zoonoses Public Health*. 2016.
3. Steere AC, Klitz W, Drouin EE, et al. Antibiotic-refractory Lyme arthritis is associated with HLA-DR molecules that bind a *Borrelia burgdorferi* peptide. *J Exp Med*. 2006;203(4):961-971.
4. Wormser GP, Brisson D, Liveris D, et al. *Borrelia burgdorferi* genotype predicts the capacity for hematogenous dissemination during early Lyme disease. *J Infect Dis*. 2008;198(9):1358-1364.
5. Rudenko N, Golovchenko M, Grubhoffer L, Oliver JH, Jr. *Borrelia carolinensis* sp. nov., a new (14th) member of the *Borrelia burgdorferi* Sensu Lato complex from the southeastern region of the United States. *J Clin Microbiol*. 2009;47(1):134-141.
6. Clark KL, Leydet B, Hartman S. Lyme borreliosis in human patients in Florida and Georgia, USA. *Int J Med Sci*. 2013;10(7):915-931.
7. Rudenko N, Golovchenko M, Lin T, Gao L, Grubhoffer L, Oliver JH, Jr. Delineation of a new species of the *Borrelia burgdorferi* Sensu Lato Complex, *Borrelia americana* sp. nov. *J Clin Microbiol*. 2009;47(12):3875-3880.
8. Oliver JH, Jr., Lin T, Gao L, et al. An enzootic transmission cycle of Lyme borreliosis spirochetes in the southeastern United States. *Proc Natl Acad Sci U S A*. 2003;100(20):11642-11645.
9. Rudenko N, Golovchenko M, Belfiore NM, Grubhoffer L, Oliver JH, Jr. Divergence of *Borrelia burgdorferi* sensu lato spirochetes could be driven by the host: diversity of *Borrelia* strains isolated from ticks feeding on a single bird. *Parasit Vectors*. 2014;7:4.

Further evidence of *Borrelia burgdorferi* sensu stricto associated with Lyme disease in the South - <https://danielcameronmd.com/evidence-borrelia-burgdorferi-sensu-stricto-associated-lyme-disease-south/>