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SPECIES COMPOSITION AND PREVALENCE OF BORRELIA INFECTIONS IN IXODES TICKS FROM THE SOUTHEASTERN COASTAL UNITED STATES

Outline
- Introduction and Justification
- Objectives
- Methods
- Anticipated Results
- Future Directions

Introduction & Justification
M.S. research project on Ixodes ticks in the southeastern coastal United States:
- tick species composition
- prevalence of the Lyme bacteria
Ticks carry and transmit a greater variety of pathogens to domestic animals than any other type of biting arthropod. Ticks are a close second to mosquitoes worldwide in human disease transmission.

*I. scapularis* and *I. affinis* are both active in the Southeastern United States.

Both have a 1-2 year life cycle and both feed on multiple wildlife hosts.

Photo Credit: Robyn Nadolny, Chelsea Wright, Wayne Hynes, Daniel Sonenshine, Holly Gaff

Old Dominion University Dept. of Biology

11/5/12
What’s there?

18 Species of *Borrelia* currently recognized in the *Bbsl* complex

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<th><em>Borrelia</em> species</th>
<th>Hosts</th>
<th>Geographic distribution</th>
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<td><em>B. garinii</em></td>
<td>Human</td>
<td>Europe, Asia, Europe, United States</td>
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<td><em>B. hermsii</em></td>
<td>Rodent</td>
<td>Europe, Asia</td>
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<tr>
<td><em>B. afzelii</em></td>
<td>Human</td>
<td>Europe, Asia</td>
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Rudenko et al. 2011

Objectives

1. To test for North–South latitudinal trends in *Ixodes* spp. genotype, and *Bbsl* prevalence and strain type.

2. In South Carolina, to compare the prevalence of *Bbsl* and *Ixodid* tick species collected from wild mesomammals with those from a) vegetation, and b) domestic dogs (Sentinels).

Materials and Methods
1. Research Sites

2. Methods for Comparing Sylvatic and Domestic Cycles
3. Laboratory Methods

- Morphological ID (Kierans and Linzmeier 1989, Cooley 1984)
- DNA Extraction (QIAamp DNA Blood Kit, Qiagen 2007)
- Minimum of 50 samples from each region (of both spp)

Sample from Field

- Morphological ID (Kierans and Linzmeier 1989, Cooley 1984)
- DNA Extraction (QIAamp DNA Blood Kit, Qiagen 2007)
- Minimum of 50 samples from each region (of both spp)

Tick Vector (D. I. V.)

- 16S Primers published by Norris (1996)
- Sequenced by UTK Molecular Biology Facility
- Logistically selected samples to be molecularly identified

Screening for Bbsl - 23S rRNA

- Outer & Inner IGS Primers published by Courtney (2004)
- Sequencing

Bbsl: Real-Time PCR

- Screening for Bbsl
- 23S rRNA

Bbsl: Nested IGS PCR

- Outer & Inner IGS Primers published by Courtney (2004)
- Sequencing

Tick & Bbsl: Genetics

- 16s Mitochondrial DNA
- Haplotype variation by region (Norris 1996)

Anticipated Results

Statistical Analysis

- Test genetic differences in ticks and Borrelia between states using AMOVA (Norris et al. 1996)
- Test for an association between Borrelia prevalence and latitude using Correlation Analysis
- Test for differences in Ixodes species composition among states using Chi-Square Tests of Association
Future Directions
1. Investigation of genetic variation among *Ixodes* populations using Next-Generation molecular tools.
2. Genetic markers may be useful for tracking geographic shifts in *Borrelia*-infected tick populations.
3. Confirmation of *Borrelia* in domestic dogs? outreach to veterinary practices in the Southeast.

References


References


Photo Credits

Wayne Hayes, Daniel Sontzther, Holly Goff
Old Dominion University Dept. of Biology
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