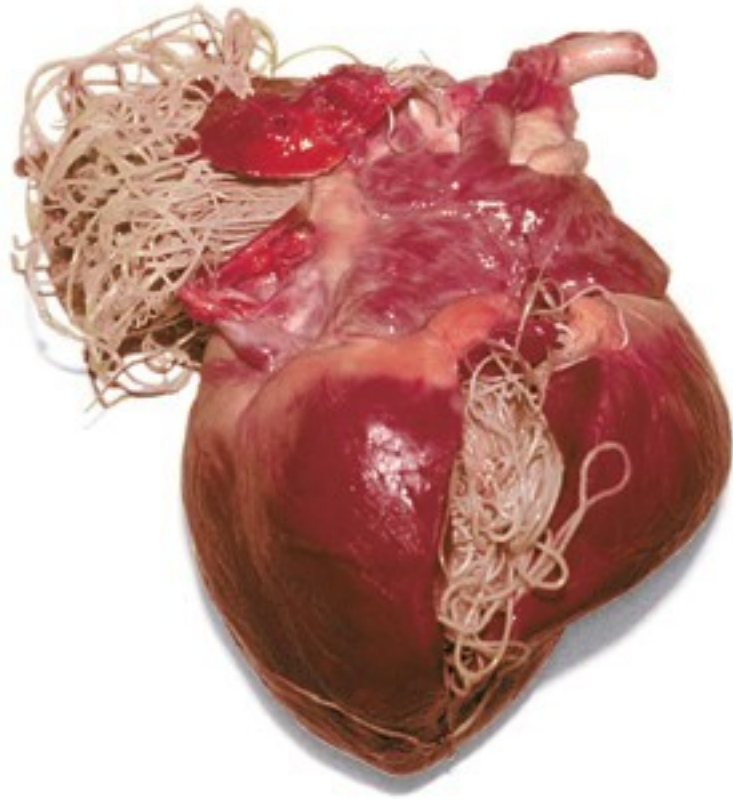


The ecology of dog heartworm disease

MEREDITH R. SPENCE BEAULIEU, MICHAEL H. REISKIND, AND
ROBERT R. DUNN

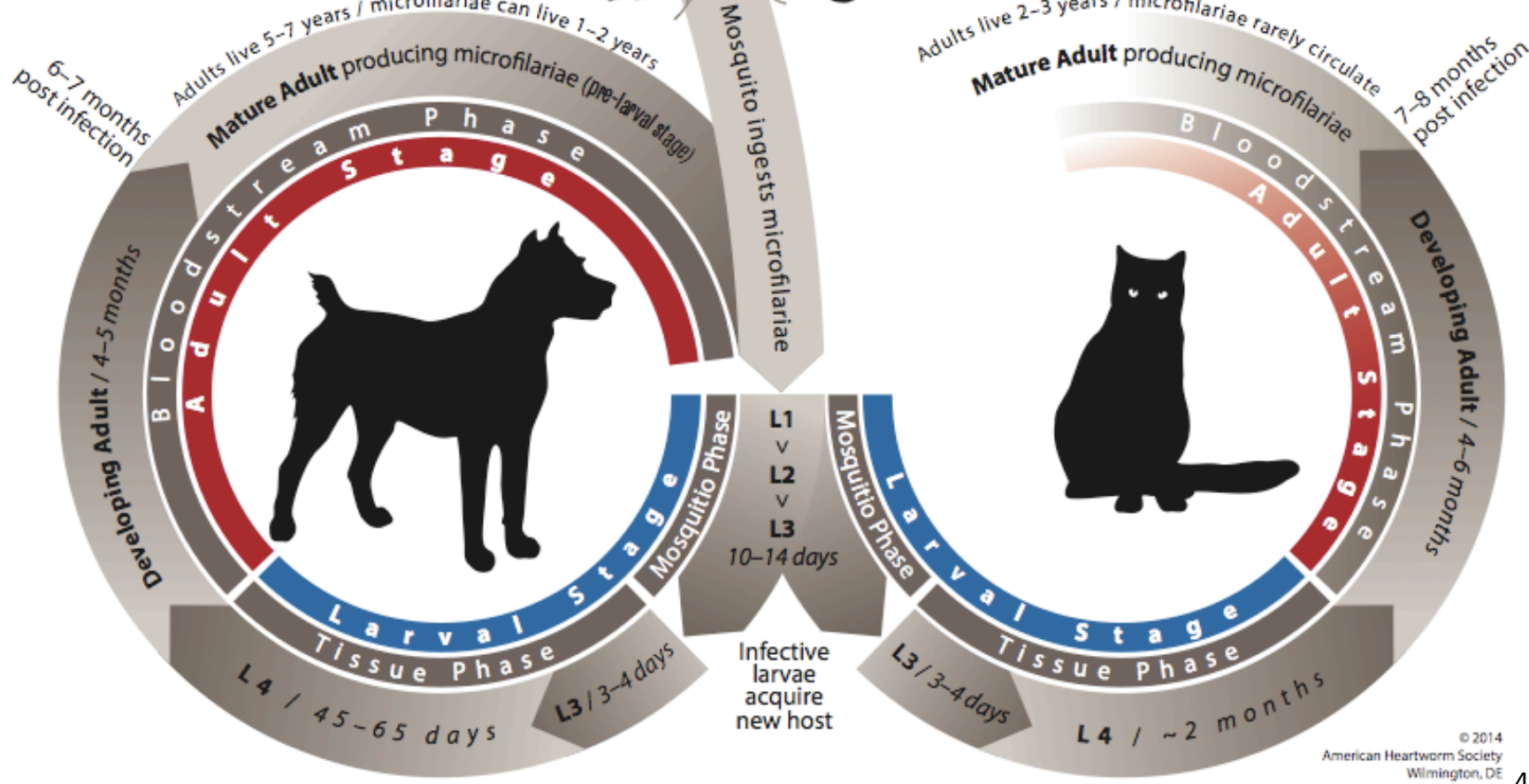
NCMVCA/MAMCA – CAROLINA BEACH, NC
FEBRUARY 12, 2018

Heartworm disease (*Dirofilaria immitis*)



- Vector-borne filarial disease
- Primary hosts are domestic and wild canids, but can affect other carnivores¹
 - Causes respiratory distress and eventually congestive heart failure
- Worldwide distribution, with high prevalence and incidence
 - Average US prevalence is 1-12%², but as high as 48.8% in certain highly endemic areas³

Heartworm disease (*Dirofilaria immitis*)

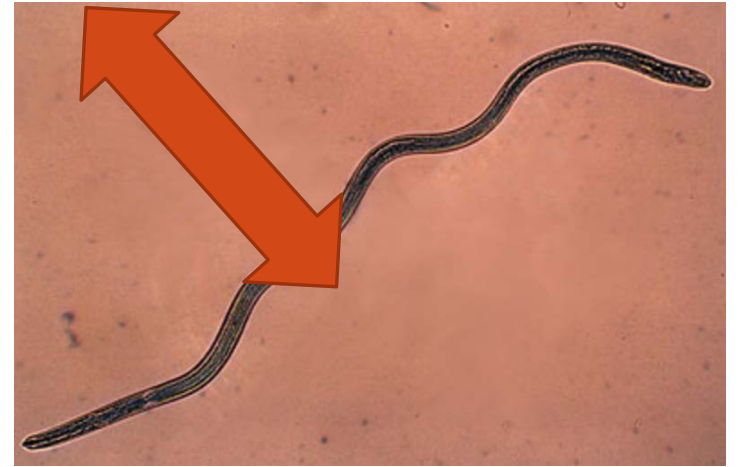
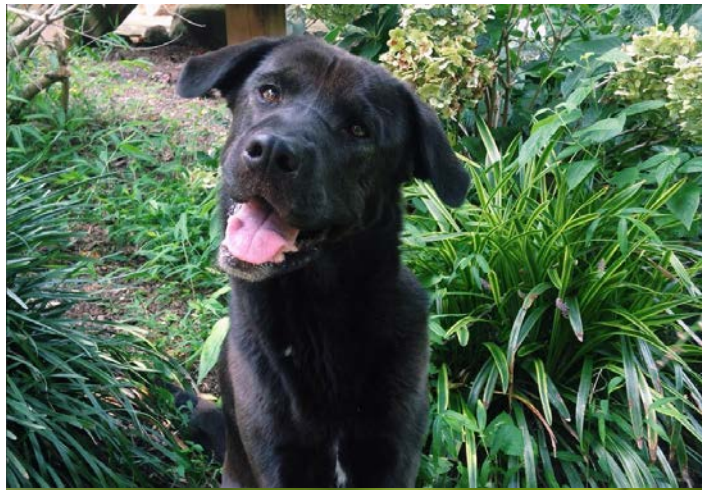


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The importance of landscape variation

- Mosquito assemblages differ between wooded and field environments^{5,6,7}



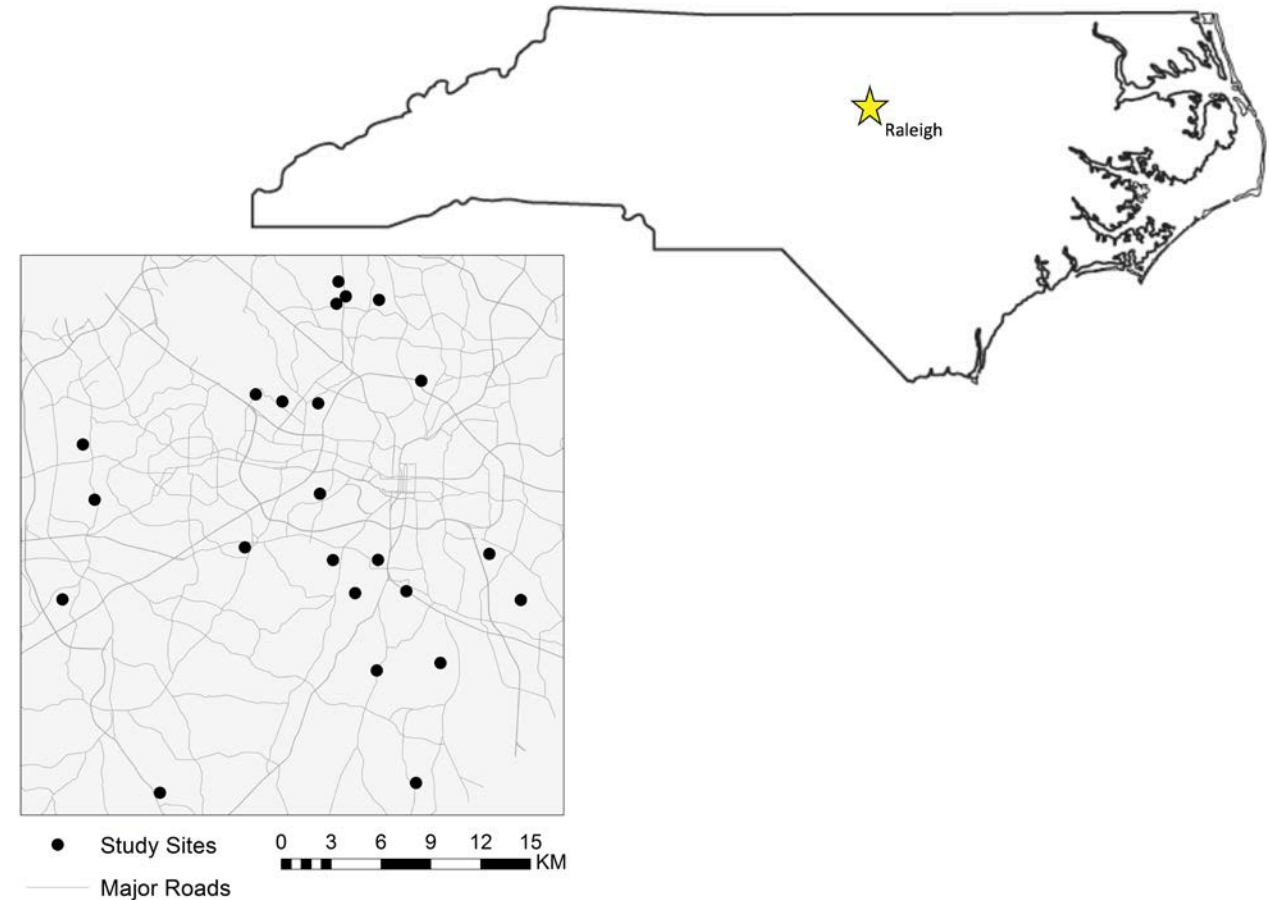
The importance of landscape variation

- Mosquito assemblages differ between wooded and field environments^{5,6,7}
- Little research has addressed how suburban development affects assemblages
- Risk for increased disease spread⁸



Methods: Vector diversity

- Trapped mosquitoes in suburban developments of different ages



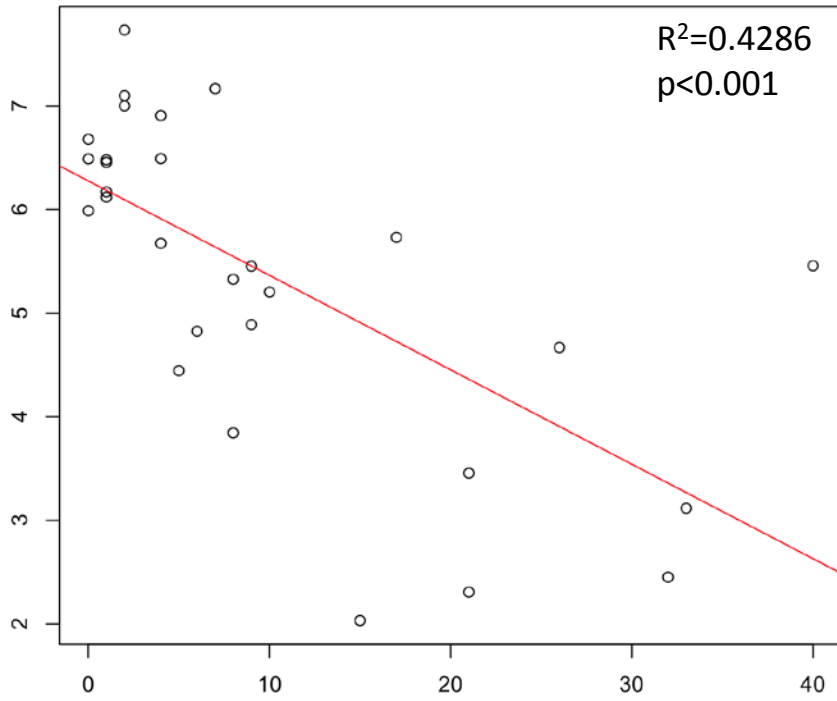
Methods: Vector diversity

- Trapped mosquitoes in suburban developments of different ages
- Sampled overnight with CDC light traps

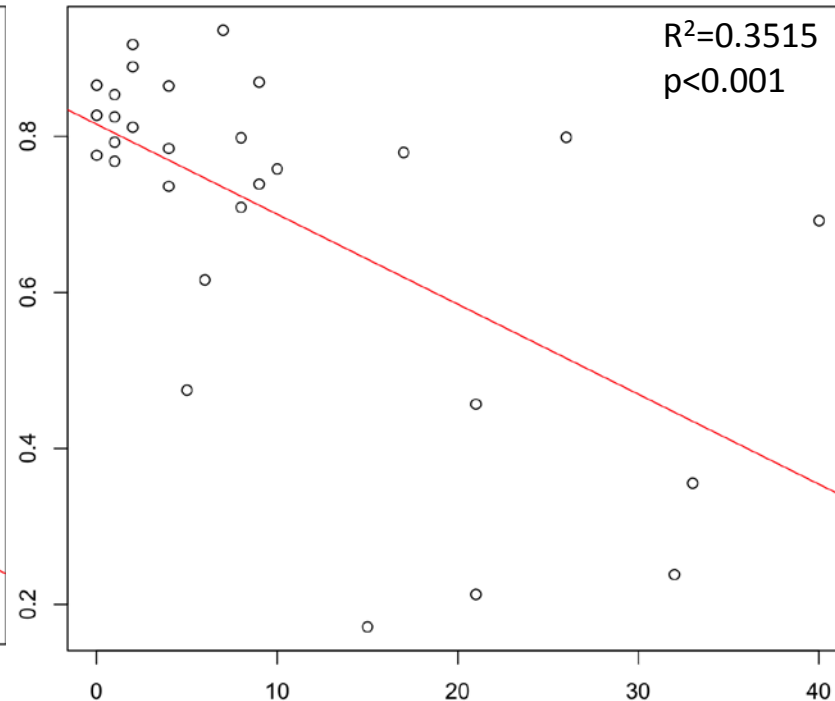


Results: Vector diversity

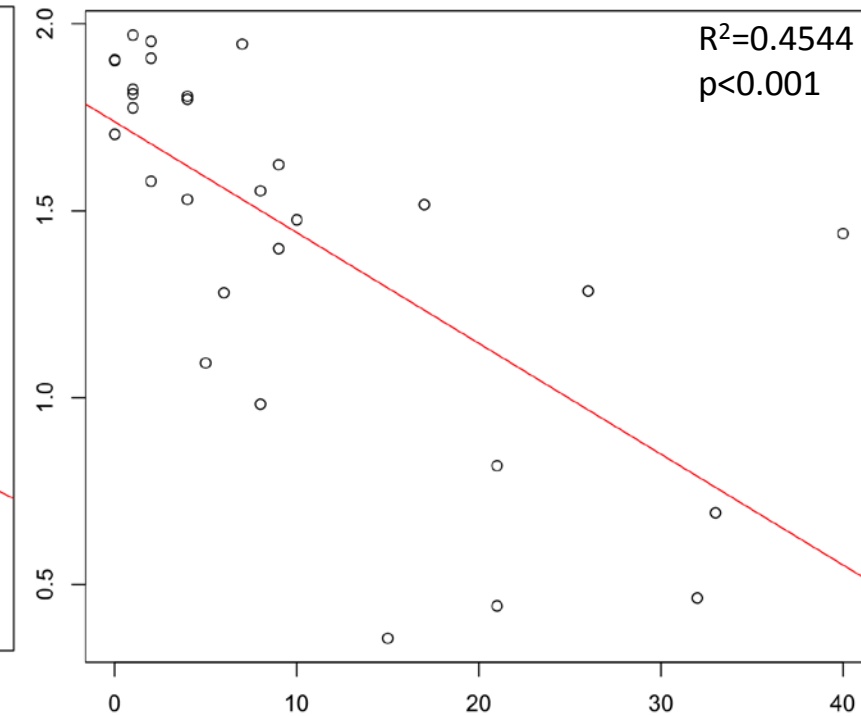
y = Rarefied Species Richness



y = Evenness

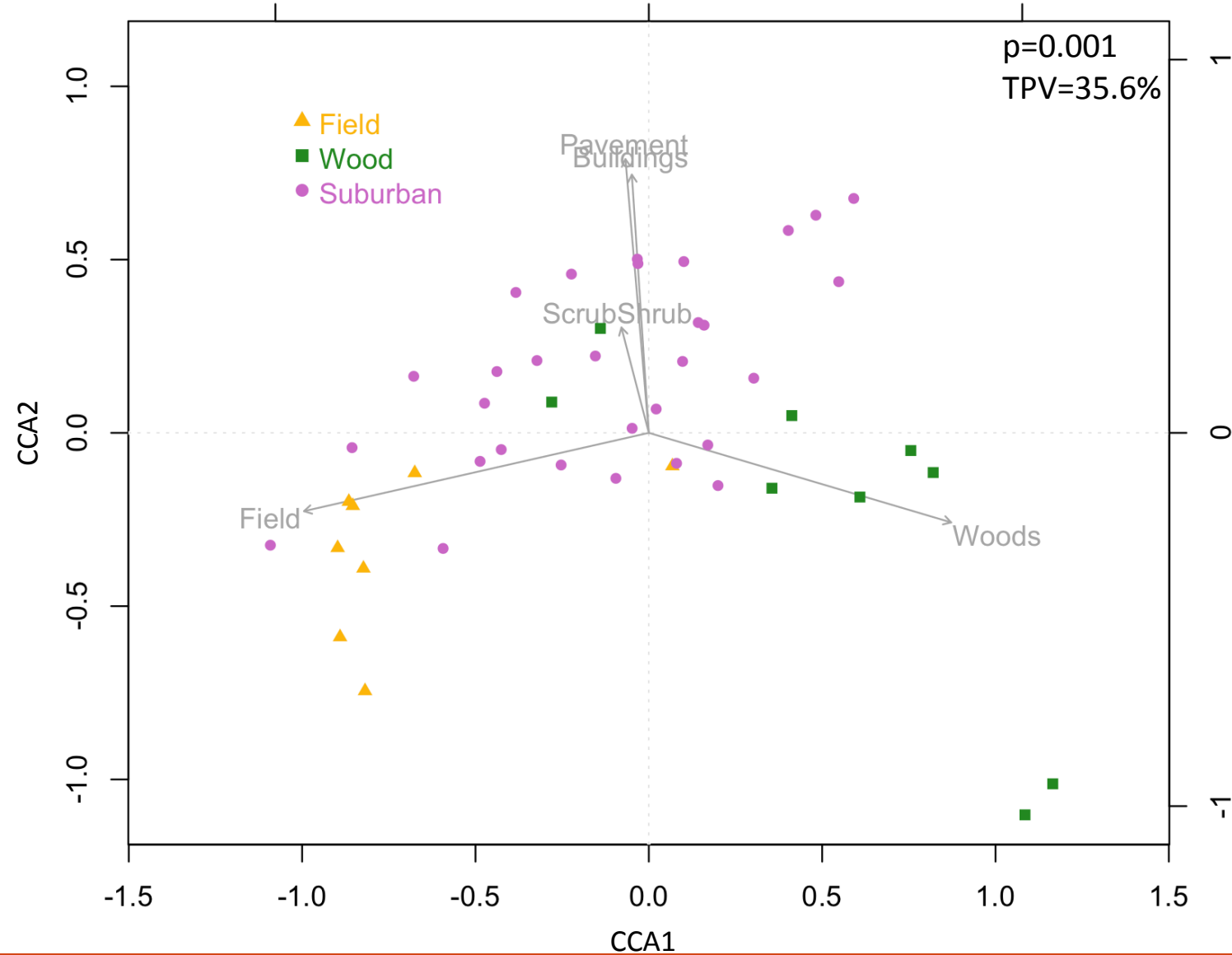


y = Shannon Wiener Diversity



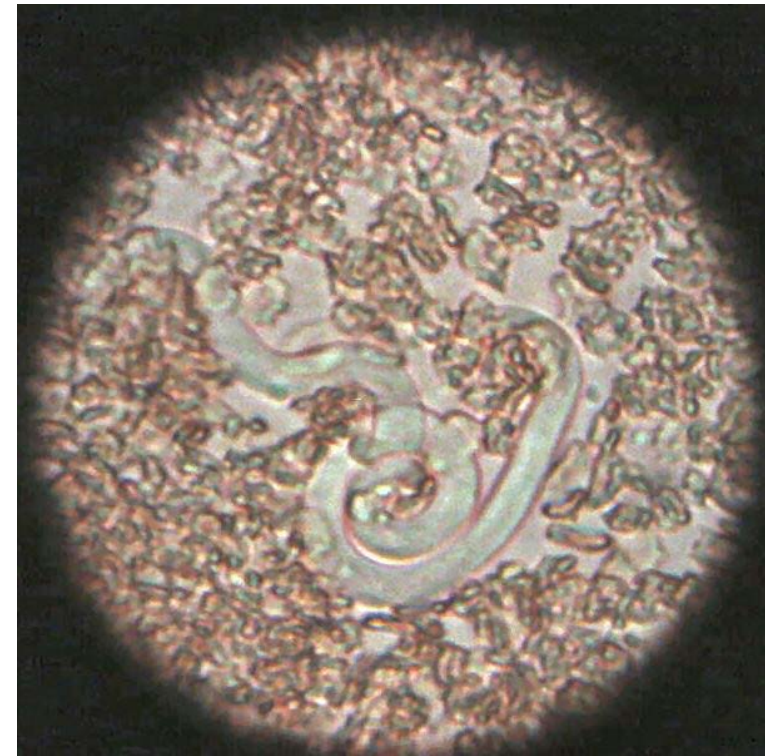
x = Neighborhood Age

Results: Species assemblages



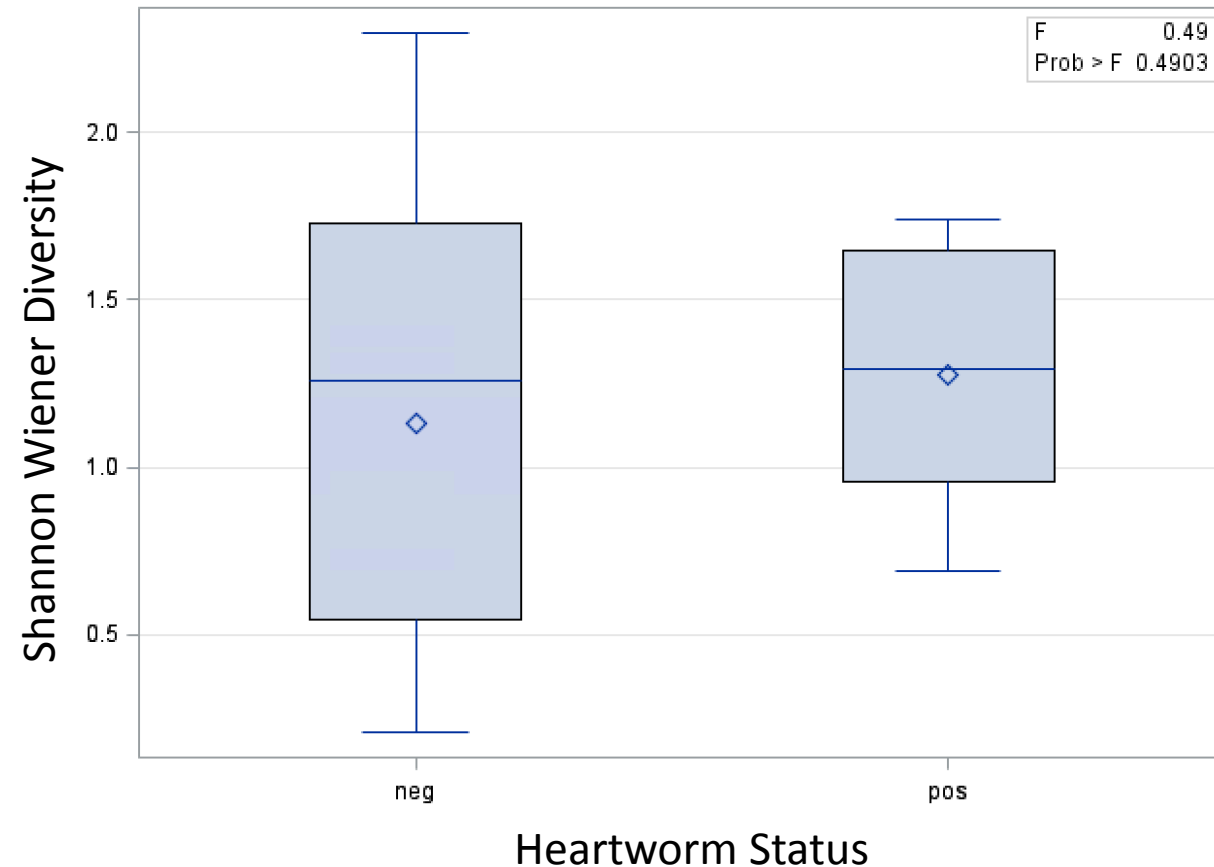
Case/control study

- Acquired data on surrendered dogs from Wake County Animal Shelter
- Matched heartworm positive dogs (case) with heartworm negative dogs (control)
 - Same month of surrender and same approximate size (small/medium/large breed)
- Sampled mosquitoes in the neighborhoods where the dogs previously resided
 - 16 case sites, 16 control sites

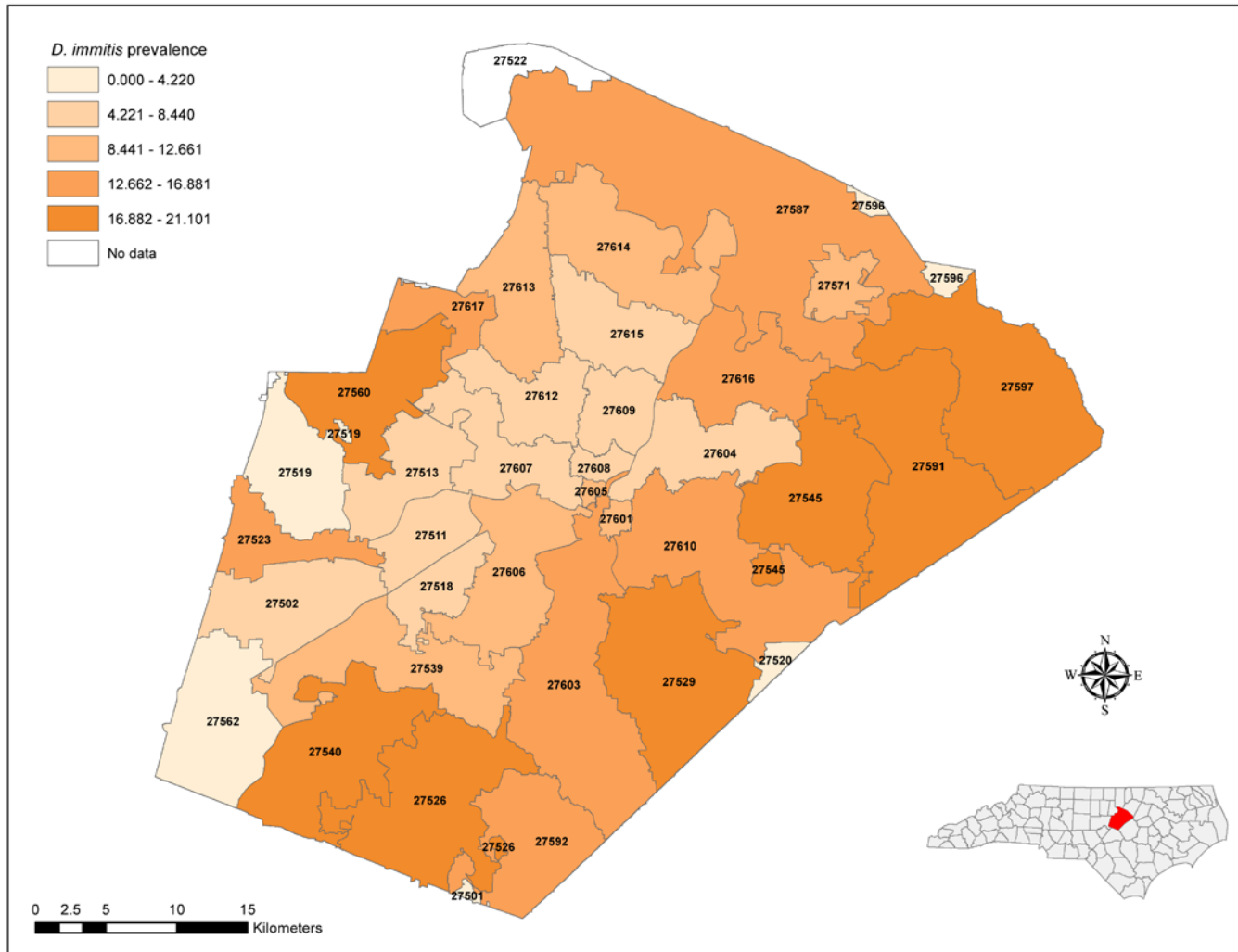


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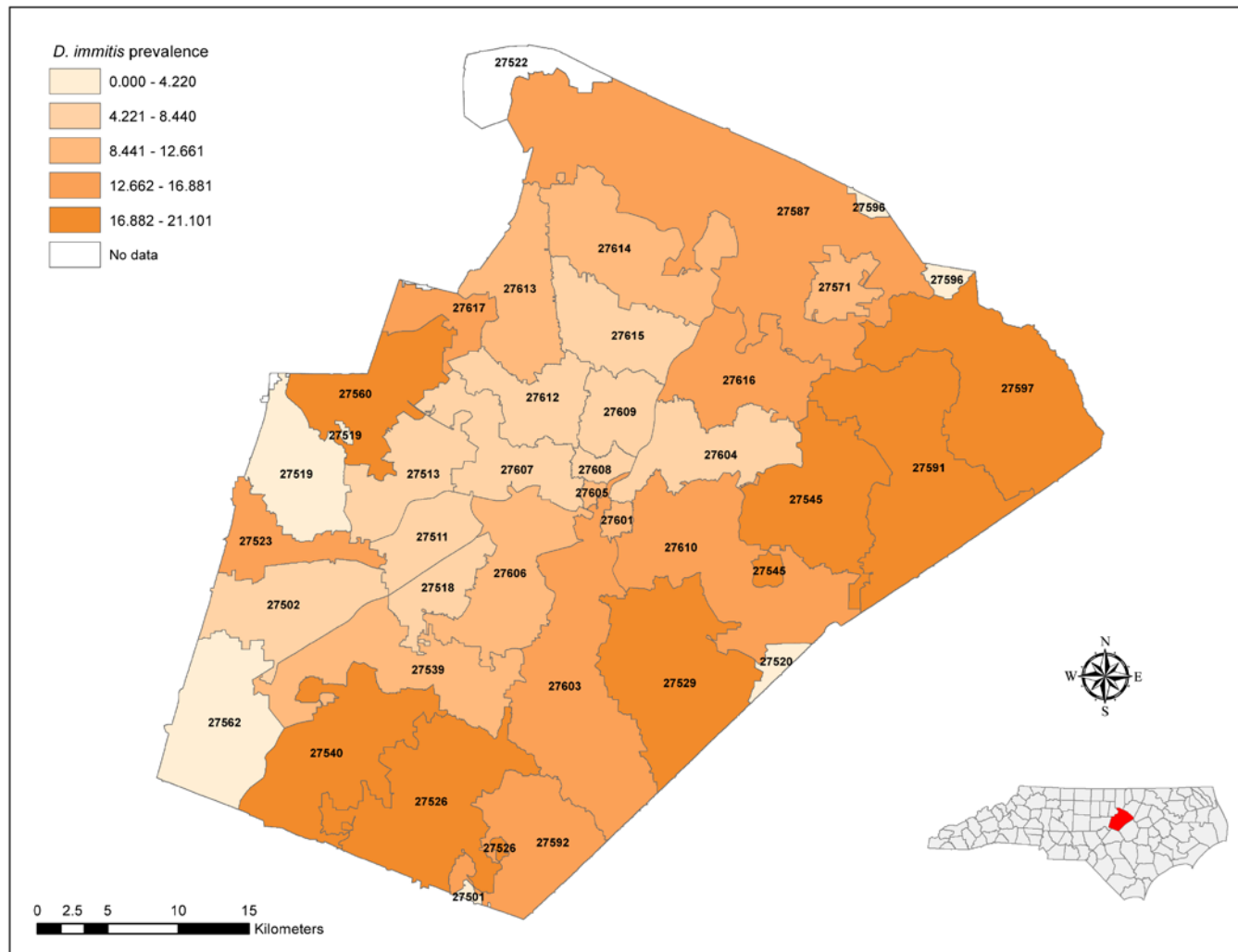
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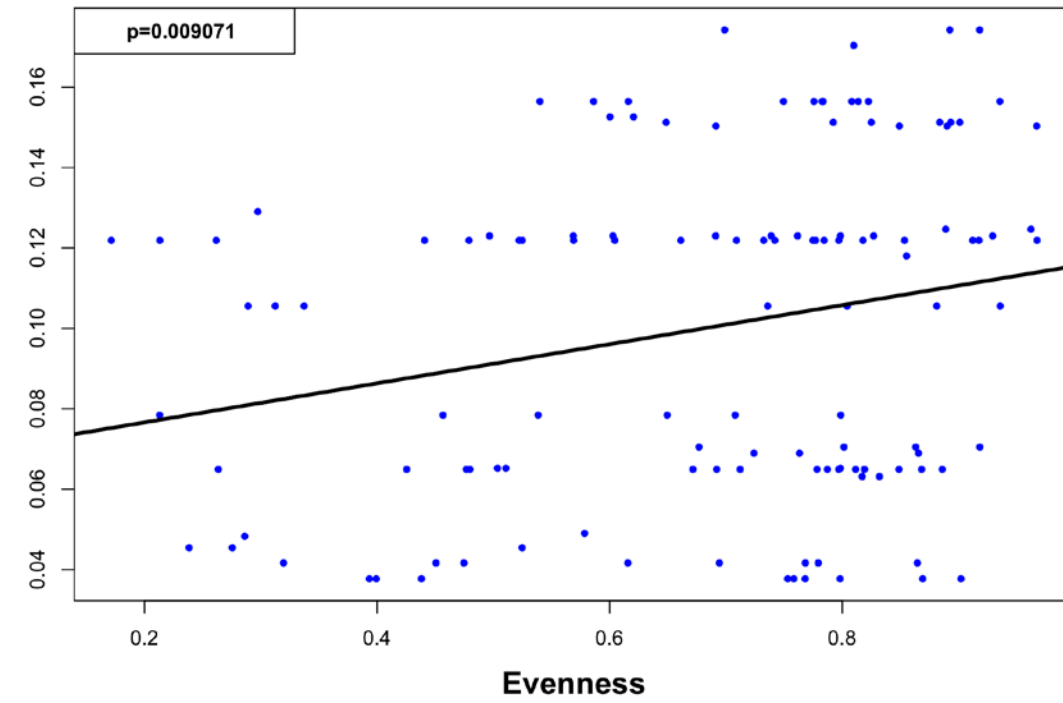
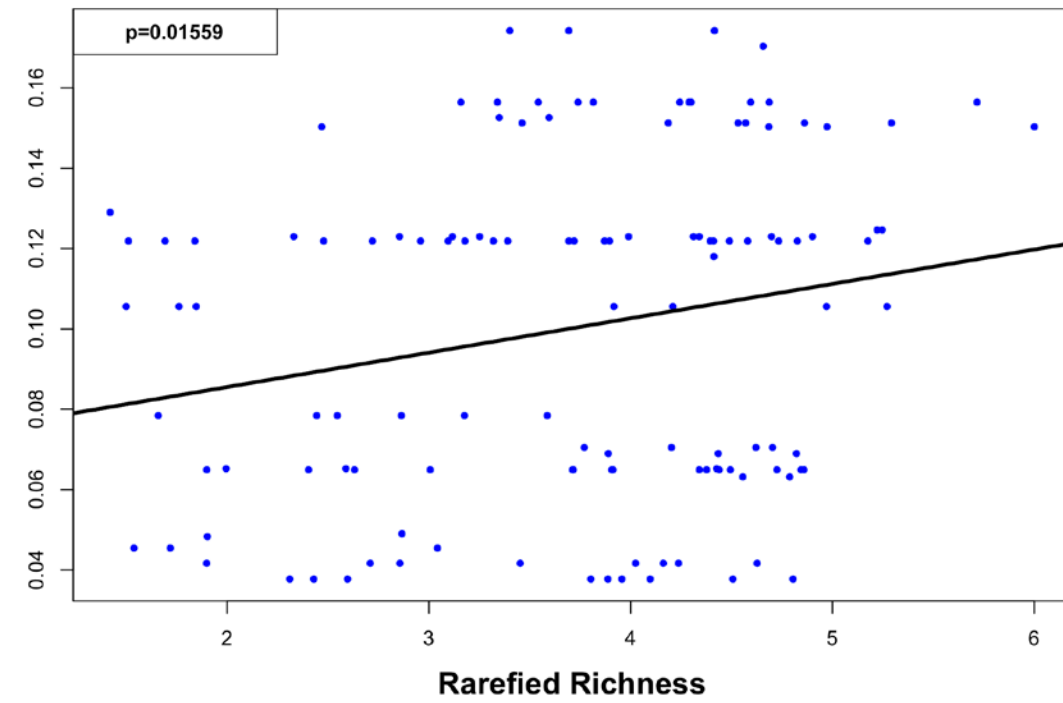
Results: Zip code comparison



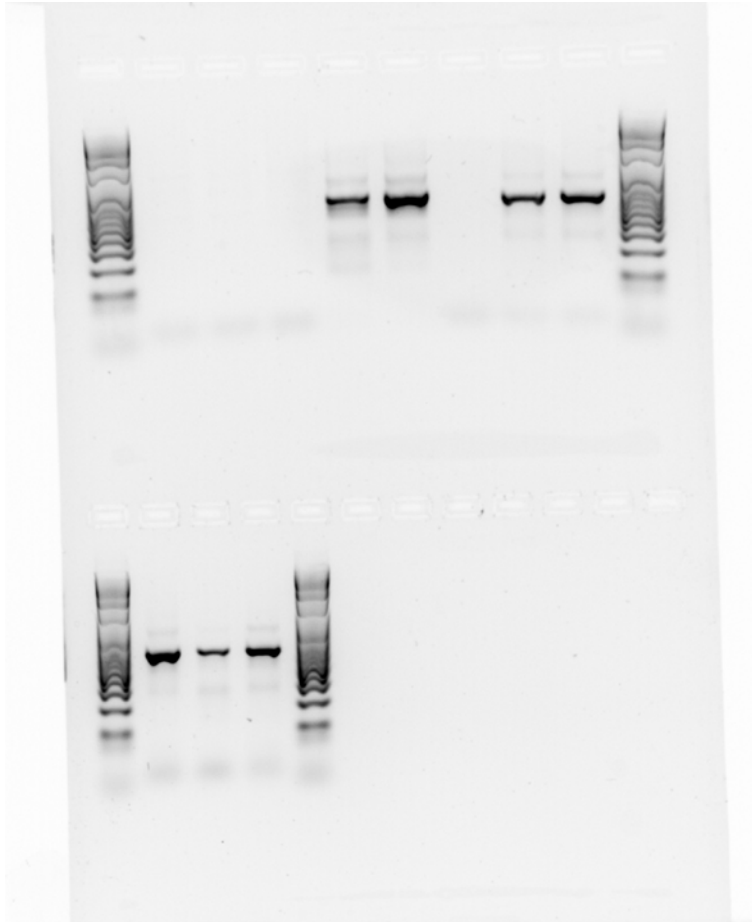
Results: Zip code comparison



Heartworm Prevalence in Dogs



Methods: *D. immitis* detection



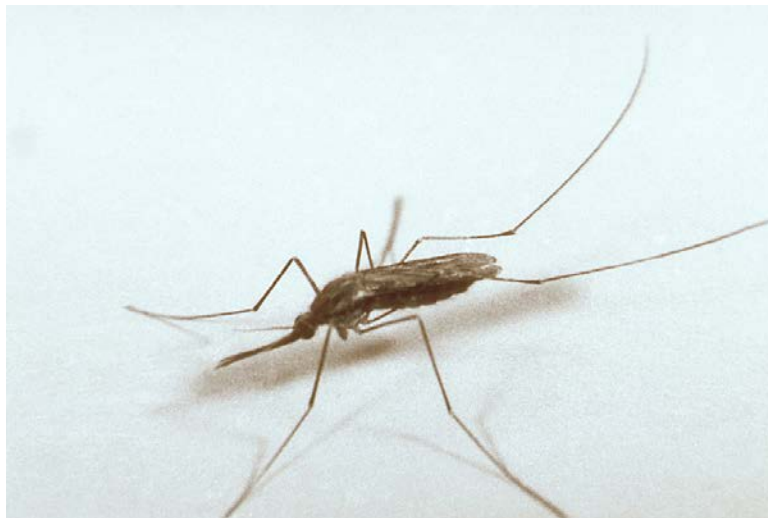
- Pooled mosquitoes by site, date, and species for DNA extraction
- PCR on mosquito pools using 5.8S rDNA filarial worm primers
- Gel electrophoresis for presence/absence

Preliminary Results: *D. immitis* detection

- 940 mosquito pools tested, 31 of which were positive for dog heartworm (3.3%)
- 11 of 30 suburban sites (36.7%) were heartworm positive

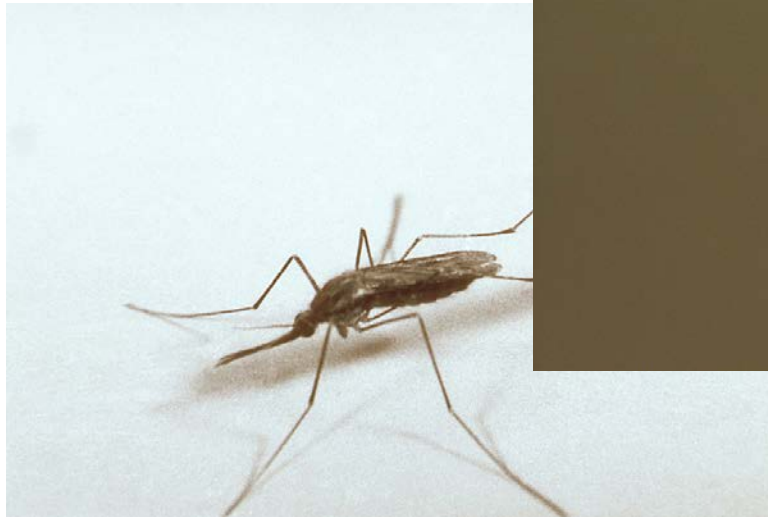
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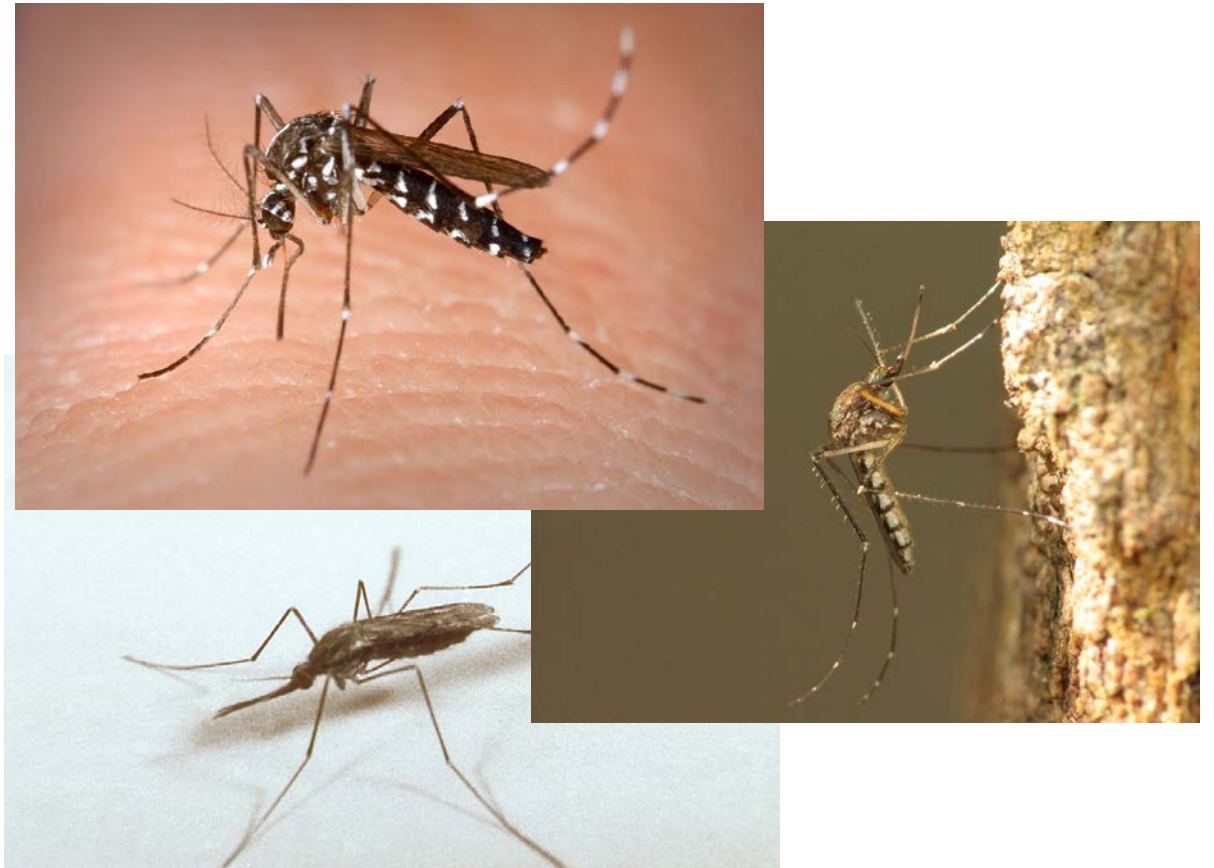
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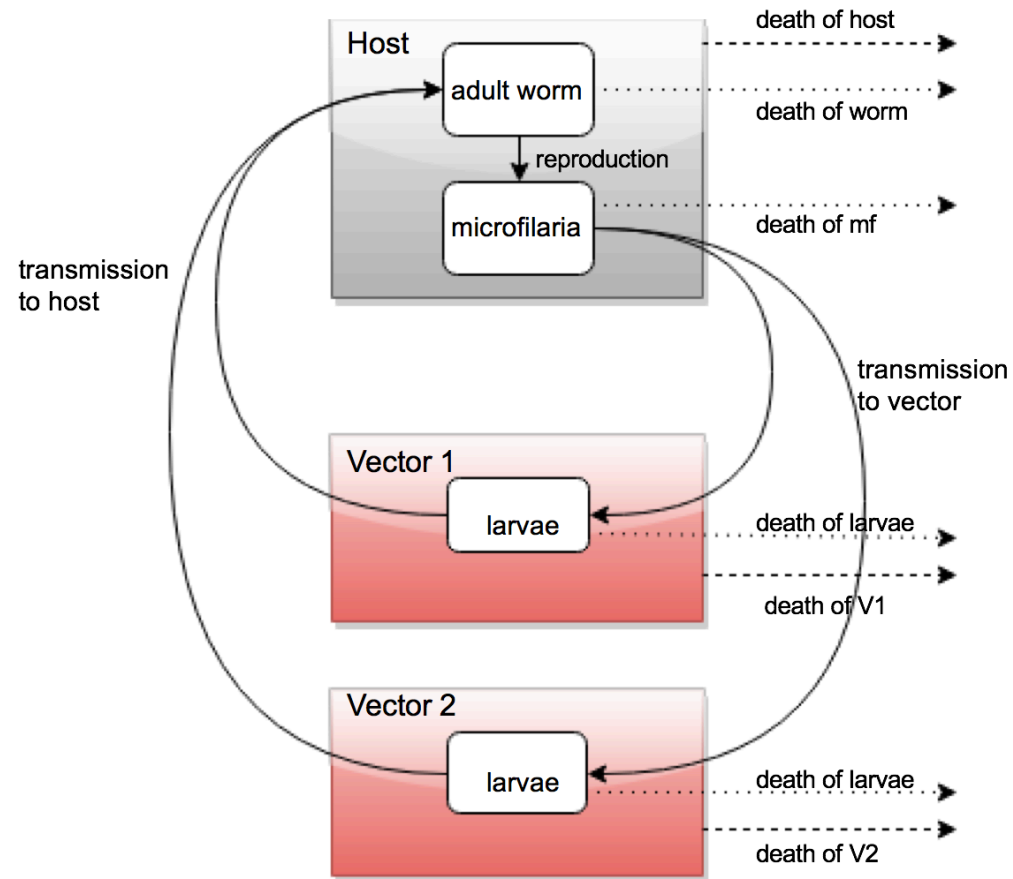


Preliminary Results: *D. immitis* detection

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D. immitis transmission model



- Goal: quantify how disease spread is affected by changes in vector diversity and abundance
- Complex system
 - multiple vectors, multiple hosts, preventions, resistance
- Can be generalized to other disease systems with multiple vectors

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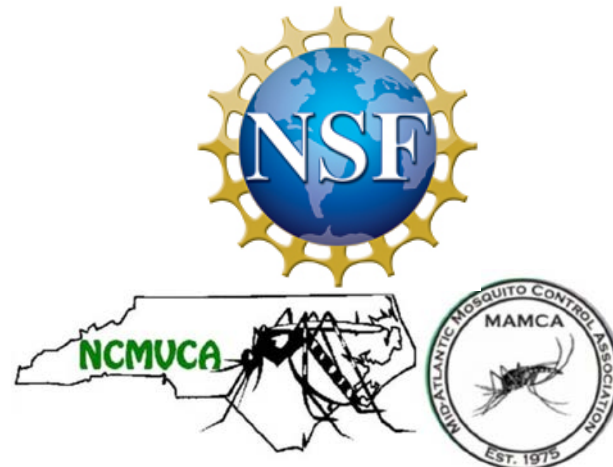
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Questions?

We love our heartworm prevention!

