High prevalence of Anaplasma platys infection in Alabama white-tailed deer

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The objective of our study was to investigate the influence of morphology, age, and ectoparasite loads on the susceptibility of white-tailed deer (Odocoileus virginianus) to Anaplasma spp. Anaplasma spp. are gram negative bacteria in the order Rickettsiales and are the causative agent of anaplasmosis. These bacteria are spread by ticks and lice and infect erythrocytes. There are multiple species of Anaplasma that infect a wide range of mammals, including companion animals, domestic livestock, wild ruminants, small mammals, and even humans. As white-tailed deer serve as a reservoir host for Anaplasma spp. across the South, we were interested in identifying which deer are likely to serve as carriers, allowing us to manage deer populations in a manner that would help protect ourselves and our animals from anaplasmosis.

This study was conducted at the Auburn University Deer Research Facility in Camp Hill, Alabama. The vegetation within the facility, which is roughly 40% open area maintained for hay production and 60% forest, is representative of the landscape encountered throughout the South. Male deer in the facility are chemically immobilized each year to maintain a marked population and to collect data for numerous ongoing projects. For our study, we took blood samples from 29 deer that were captured in the fall of 2016. Body and antler measurements, as well as full body (excluding the legs) ectoparasite counts were taken for the same individuals. The blood samples were screened for Anaplasma spp. with a 16S rRNA gene FRET-qPCR.

Twenty-four of the 29 deer screened were positive for Anaplasma platys (no other species of Anaplasma were detected).Body weight of male deer fluctuates drastically throughout the year; therefore, we used a principle components analysis to create a continuous variable for body size based upon chest girth, total body length, and hind foot. We then ran a regression analysis to examine the effect of deer body size on infection level of A. platys, and we found that there was no effect ($P = 0.644$). Additionally, a regression indicated that antler size did not influence the infection level of deer ($P = 0.840$), and a Fisher exact test indicated that age did not influence infection level ($P > 0.05$). However, we did find that infection levels increased with increasing tick loads ($P = 0.038$) (Figure 1). Our results suggest that morphology and age do not influence which deer serve as reservoir hosts for anaplasmosis, but the presence of a vector is vital for the life cycle of this bacteria. It is surprising that A. platys is the species found in the deer, since it has never been documented in white-tailed deer and canines serve as the primary reservoir host. Yet considering the prevalence of free roaming dogs, and the ubiquitous nature of deer and ticks, it is not unreasonable to think that A. platys is widespread in deer across the South. It is imperative to conduct further research to better understand how A. platys exploits deer, allowing us to prevent livestock and human exposure.

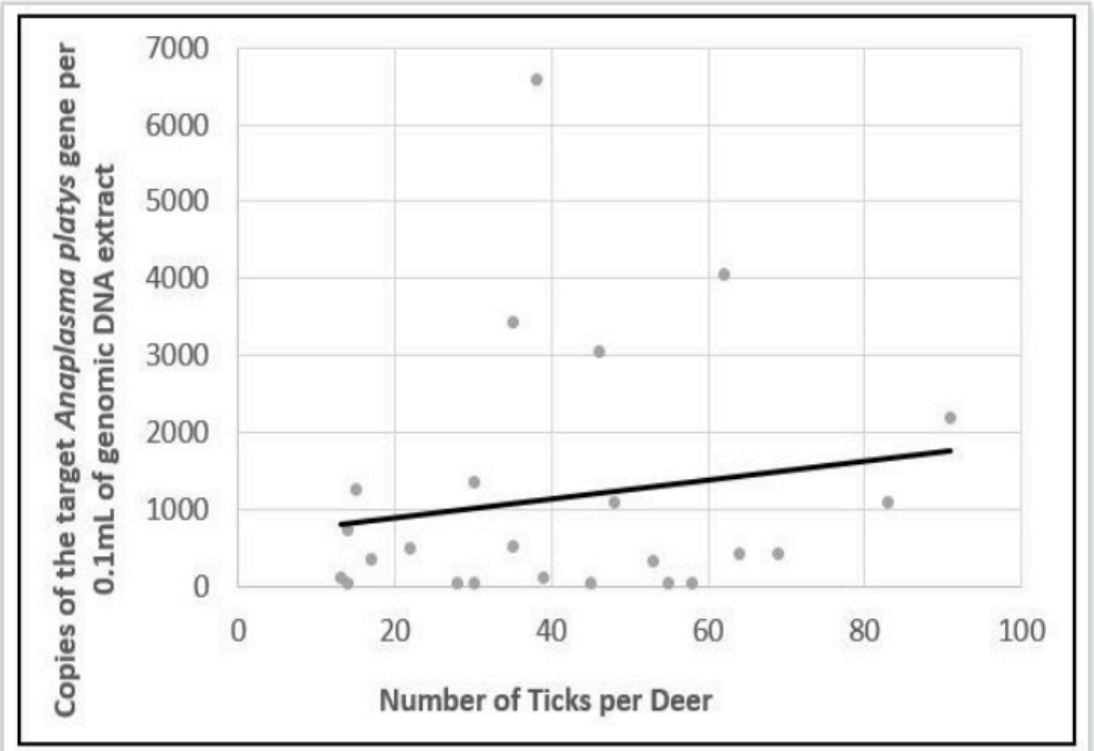

Figure 1 - *Anaplasma platys* infection level in white-tailed deer, determined by the number of copies of the target gene in 0.1 mL of genomic DNA extract, was positively correlated with tick loads ($P = 0.038$).

Statement of Research Advisor:

This research has considerably expanded our knowledge concerning the role of white-tailed deer as a reservoir for Anaplasmaspp., and the finding that Anaplasma platys was the primary strain detected was extremely novel—Stephen Ditchkoff, Forestry and Wildlife Sciences