Host factors associated with blood parasite infections in aquatic turtles in Georgia

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INTRODUCTION

- Haemogregarina, one of the four genera of haemogregarines, are common intrarhizocytic protozoan parasites of reptiles (Raychev, 2005).
- Haemogregarina are presumed to be transmitted by leeches based on a single experimental study (Siddall and Deare, 2001).
- The behavior of aquatic turtles, along with other factors (e.g., gender, habitat, seasonality, etc.) likely influence the frequency of which turtles come into contact with leeches.
- It has been hypothesized that basking behavior of turtles can alter exposure to leeches and subsequent infection of turtles with haemogregarines.
- McAllister (1977) reported that parasites of the nonbasking Common Snapping turtle (Chelydra serpentina) was higher than that of two basking species (Eastern Painted turtles (Chrysemys picta) and Blanding’s turtles (Emydoidea blandingii)) in Nebraska.
- Additionally, Davis and Sterrett (2011) reported a similar finding for two basking species, pond slider (Trachemys scripta) and C. picta, compared with the nonbasking species, the common musk turtle (Sternotherus odoratus). However, sample sizes were small (n=2 total for all three species).
- Clarke, Madison, and Baker Counties. Archived blood samples from Costa Rica were provided permission to trap on their property.

METHODS

- Data from this study supports the hypothesis that turtle behavior (i.e., basking or non-basking) increases prevalence and parasitism of Haemogregarina, which is likely due to frequency of contact turtles have with leeches. However, there are within group parasitism differences which indicates that either there are within group differences in leech exposure that may result in repeat infections (which hasn’t been studied) or there are other factors that influence infection intensity.
- No difference in prevalence was noted between genders even though they have different intrinsic (e.g., testosterone in males) or extrinsic (e.g. females laying eggs on land away from leech vectors) factors that could impact infection dynamics.
- Based on DNA sequences, there is a possibility that different species of Haemogregarina are infecting the examined turtle species; however, the species are not host specific as each group contain different species of turtles.
- Additional data from different turtles in various locations are needed to better understand the ecology of this understudied group of parasites.

RESULTS

| Non-baskers have a higher prevalence compared with baskers; however, gender have no major difference |

<table>
<thead>
<tr>
<th>Group</th>
<th>No.</th>
<th>positive/No. tested (%)</th>
</tr>
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<tbody>
<tr>
<td>Basking</td>
<td>123/286 (43)^a</td>
<td></td>
</tr>
<tr>
<td>Nonbasking</td>
<td>91/103 (88)^b</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>83/159 (52)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>119/214 (56)^a</td>
<td></td>
</tr>
<tr>
<td>Softshell (ASPIN)</td>
<td>3/4 (75.0)^a</td>
<td></td>
</tr>
<tr>
<td>Painted (CHPIC)</td>
<td>49/143 (34)^a</td>
<td></td>
</tr>
<tr>
<td>River cooter (PSCON)</td>
<td>4/16 (25)^a</td>
<td></td>
</tr>
<tr>
<td>Pond slider (TRSCR)</td>
<td>70/127 (55)^a</td>
<td></td>
</tr>
<tr>
<td>Common snapper (CHSER) (STODO/STMIN)</td>
<td>12/27 (44)^a</td>
<td></td>
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</table>

Parasitemias for nonbasking species was significantly higher than basking species. Among the nonbaskers, CHSER had lower parasitemias compared with STMIN/STODO. Among the baskers, TRSCR had higher parasitemias compared with PSCON and CHPIC.

- Little variation was noted in the ~600bp of the 18S rRNA gene region sequenced (did span V4 variable region). Phylogenetic analyses resulted in one large group with no divisions due to low bootstrap values.
- Based on several nucleotide differences, at least four groups were noted and these groups had representatives of basking and nonbasking species.
- Group A included (CHPIC, TRSCR, CHPIC, ASPIN, (chicken turtles, Deirochelys reticularia) and GRBAR (Barbour’s Map turtle, Graptemys barbouri)) from the United States and (BR, Black river turtles (Rhinochelys funera) and white-tipped mud turtles (MUD, Kinosternon leucostomum)) from Costa Rica.
- Group B included samples from PSCON, TRSCR, CHPIC, STMIN and a CHSER as the United States.
- Group C included a single sample of a snapping turtle (CHSER) from Canada (see Barta et al., 2013).
- Six turtles were co-infected with two genetic groups, five of which are likely infections with four having both groups A and B (n=4) and one with Groups A and D. A single mud turtle had a mixed infection with two unknown genetic types.

CONCLUSIONS

- Data from this study supports the hypothesis that turtle behavior (i.e., basking or non-basking) increases prevalence and parasitism of Haemogregarina, which is likely due to frequency of contact turtles have with leeches. However, there are within group parasitism differences which indicates that either there are within group differences in leech exposure that may result in repeat infections (which hasn’t been studied) or there are other factors that influence infection intensity.
- No difference in prevalence was noted between genders even though they have different intrinsic (e.g., trachemys scripta in males) or extrinsic (e.g. females laying eggs on land away from leech vectors) factors that could impact infection dynamics.
- Based on DNA sequences, there is a possibility that different species of Haemogregarina are infecting the examined turtle species; however, the species are not host specific as each group contain different species of turtles.
- Additional data from different turtles in various locations are needed to better understand the ecology of this understudied group of parasites.

REFERENCES


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