

Apr 16th, 11:00 AM - 2:00 PM

Baylisascaris procyonis prevalence in raccoons (Procyon lotor) and its relation to landscape features

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Ingle, Matthew E.; Dunbar, Stephen G.; Bartsch, Jaynee L.; Culbertson, Kyle J.; Fulton, Taylor A.; Guffey, Katherine R.; Juris, Aubrey J.; Nolan, Ashlie N.; Nordquist, Dan P.; Rowlands, Carrie E.; and Sitler, Joshua A., "Baylisascaris procyonis prevalence in raccoons (Procyon lotor) and its relation to landscape features" (2014). *The Research and Scholarship Symposium*. 15. http://digitalcommons.cedarville.edu/research_scholarship_symposium/2014/poster_presentations/15

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Presenters

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Introduction

Raccoons (*Procyon lotor*) are the final host for raccoon roundworm (*Baylisascaris procyonis*). Raccoon roundworm is the leading cause of a dangerous neurological disease known as larva migrans encephalopathy. Land fragmentation occurs when natural environments are broken up by urban or agricultural landscapes. Raccoons thrive in urban environments, while raccoons in agricultural settings forage over larger areas than raccoons in urban settings do. Land fragmentation affects concentrations of *B. procyonis* parasites in intermediate hosts.

Hypotheses

***B. procyonis* prevalence will differ significantly between townships.**

Landscape features will be significantly good indicators of parasite prevalence found within raccoons.

Acknowledgements

We would like to thank Dave Pitstick, Dave Linkhart and Steve Hiller for providing the raccoons for us. We would also like to thank Mindy Vasser, Kara Yutzy and Kelsey Cowen for their work in the field. Finally, we would like to thank Dr. Mark Gathany and Dr. Kristen Page for guidance and encouragement.

Results

Table 1*: Regressions testing the correlation between parasite prevalence, presence and abundance and several landscape features.

Dependent Variable	Independent Variables added stepwise or conditionally	Model Independent Variables*	β	S.E.	Score or Test Statistic	p-value
Roundworm Prevalence	<i>Turb</i> <i>Tag</i> <i>M</i>	<i>Tag</i>	0.814	.050	16.262	<0.001
Roundworm Presence	<i>Turb</i> <i>Tag</i> <i>M</i>	<i>Turb</i> <i>M</i>	-5.079 0.073	1.192 0.016	1.974 5.295	.160 0.021
Roundworm Abundance	<i>Turb</i> <i>Tag</i> <i>M</i>	<i>Turb</i> <i>Tag</i>	22.726 -33.892	3.491 13.776	6.511 -2.460	<0.001 0.015
Cestode Prevalence	<i>Turb</i> <i>Tag</i> <i>M</i>	<i>Tag</i>	0.381	0.093	4.075	0.004
Cestode Presence	<i>Turb</i> <i>Tag</i> <i>M</i>	<i>Turb</i>	-9.690	1.323	76.776	<0.001
Roundworm Presence	Cestode Presence	Cestode	0.972	0.314	10.373	0.001

* All of the independent variables were added stepwise to determine the best model. The best model was determined to be the model that explained the most variation in the dependent variable without adding additional variation.

** These were the independent variables that contributed to the best model.

Table 2. Landscape features for the nine townships surveyed*.

Township	<i>Do</i>	<i>DI</i>	<i>Dm</i>	<i>Dh</i>	<i>P</i>	<i>C</i>	<i>TA</i>	<i>Turb</i>	<i>Tag</i>	<i>M</i>
Beavercreek	1294	325	116	22	1332	1627	5752	0.3055	0.5144	9.19
Xenia	863	365	47	9	1727	6425	11391	0.1127	0.7157	11.40
Miami	403	28	7	2	736	4013	6683	0.0658	0.7106	14.53
German	669	238	88	39	1415	4891	8641	0.1197	0.7298	13.00
Green	815	85	37	8	830	6600	9243	0.1022	0.8039	16.75
Harmony	640	213	32	5	1033	10083	12921	0.0689	0.8603	17.76
Mad River	1055	450	66	12	1014	4562	8415	0.1881	0.6626	9.81
Moorefield	729	603	168	71	1674	3270	8657	0.1815	0.5711	9.63
Springfield	1912	778	140	58	936	3926	8835	0.3269	0.5503	7.12

* (*Do*) developed-open, (*DI*) developed-low, (*Dm*) developed-medium, (*Dh*) developed-high, (*P*) pasture/hay, (*C*) cultivated crop, (*TA*) total area, (*Turb*) proportion of landscape modified urban, (*Tag*) proportion of landscape modified agriculture and (*M*) mean patch size. All of the measurements are in hectares (ha).

Methods

We conducted the research on raccoons from Greene and Clark Counties in Southwest Ohio (Table 2). We collected the entrails from trapped raccoons at two different work sites: one located in Xenia, OH and one located in Harmony Township, OH. The raccoons trapped in between collection days were stored until we arrived. We collected 232 raccoon entrails from November 10 through December 9.

We necropsied the full length of the small intestines, collecting any *B. procyonis* worms we found. We made note of the number of *B. procyonis* worms found in each raccoons. We computed the overall prevalence of *B. procyonis* by dividing the total number of raccoons that contained at least one roundworm by the total number of raccoons necropsied. We repeated this process for the raccoons from only Greene County, and the raccoons from only Clark County. This process was repeated for each township.

Conclusions

We calculated the prevalence of raccoon roundworm in 9 townships of Greene and Clark Counties by necropsying 226 raccoon intestines. Prevalence is defined as the number of raccoons infected with roundworm divided by the total number of raccoons sampled. We determined that the prevalence of *B. procyonis* from Beavercreek township is significantly lower than the other townships ($\chi^2 = 25.19$, p-value = 0.0007). Prevalence of raccoon roundworm in this region is lower than many areas in the Midwestern United States, suggesting the need for further research to determine reasons for the lower prevalence in the Ohio region. Many landscape features, including the proportion of landscape modified as agriculture are significant predictors of *B. procyonis* prevalence.

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