

# Quantifying the Presence of *Toxoplasma gondii* in Songbirds

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*Toxoplasma gondii* is a parasite found throughout the world, infecting every warm blooded species on Earth, including humans. Felid species (i.e., domestic cats, bobcats, etc.) are the definitive hosts, where reproduction takes place, and are responsible for shedding eggs through their feces. Once ingested, the parasite can have a variety of consequences to the host. Because Toxo is so widespread throughout the world, many different strains have evolved. These different strains of *T. gondii* may lead to different health outcomes in the host species. It is important to understand the potential risks of spreading different Toxo strains as well as the possible effects the strains may have on the hosts. We chose to look at songbirds as potential vectors of Toxo because they have the ability to travel such far distances. We began our research with two objectives: to determine if song birds can be carriers of the parasite *T. gondii* and to determine if migratory birds over one year of age are more likely to be infected with foreign strains of *T. gondii* than resident birds. We specified an age group for the migratory birds because birds under one year will not have migrated yet. To begin studying the prevalence of Toxo as well as the potential spread of different Toxo strains I wanted to determine whether there was Toxo in the birds here in Alabama. Over the past year I opportunistically collected deceased birds from around Auburn. There were no birds harmed for the purpose of this research.

We attempted to identify all birds to species, sex, and age, and whether they were migratory or resident. The sexing of the birds was determined by plumage and aging was done via plumage or skull ossification. Because *T. gondii* forms cysts inside tissue throughout the body, we used a variety of tissue samples to increase the likelihood of detecting the parasite. We collected tissue samples from the brain, heart, and kidneys. Once samples were collected, we extracted DNA and analyzed for *T. gondii* genetic markers via Polymerase chain reaction (PCR). In total, we evaluated 30 samples of various species. Among our samples we had a single positive detection of *T. gondii* from a Purple Finch

(*Haemorhous purpureus*). The finch was a female that had been collected about 10 Km from Auburn University in February 2015. Purple Finches are a migratory species that spend the summer in Canada and the northeastern United States and the winters as far south as Florida. Using a binomial equation, we were able to determine that the rate of infection is 3.3% in songbirds in the Auburn area with a confidence interval of 0.08% to 17.22%. Our analysis presents an important detection of *T. gondii* in songbirds of North America.

## Statement of Research Advisor

Alisia's work provides a wonderful first step in using incidental bird mortalities to evaluate for a parasite that is of increasing concern to both human and wildlife health.

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