

***Toxoplasma gondii*, spread by domestic cats (*Felis catus*), infects wildlife & humans worldwide but little is known about how environmental factors influence infection prevalence**

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1. What are the associations between environmental variables (soil temperature, moisture and habitat fragmentation) on *T. gondii* infection in sentinel small mammals?
2. How do soil conditions interact with oocyst survival, and fragmentation with *Felis catus* occupancy to increase infection prevalence, and which is more important in driving infection prevalence?



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Statistical Question: How are environmental variables and cat occupancy associated with intermediate host infection prevalence?

> $\ln(\text{Infection}) = \beta_0 + \beta_1(\text{habitat fragmentation}) + \beta_2(\text{cat occupancy}) + \beta_3(\text{soil moisture}) + \beta_4(\text{soil temperature}) + \epsilon(\sigma_{\text{site}}, r_{\text{site}}) + \epsilon(\sigma, r)$

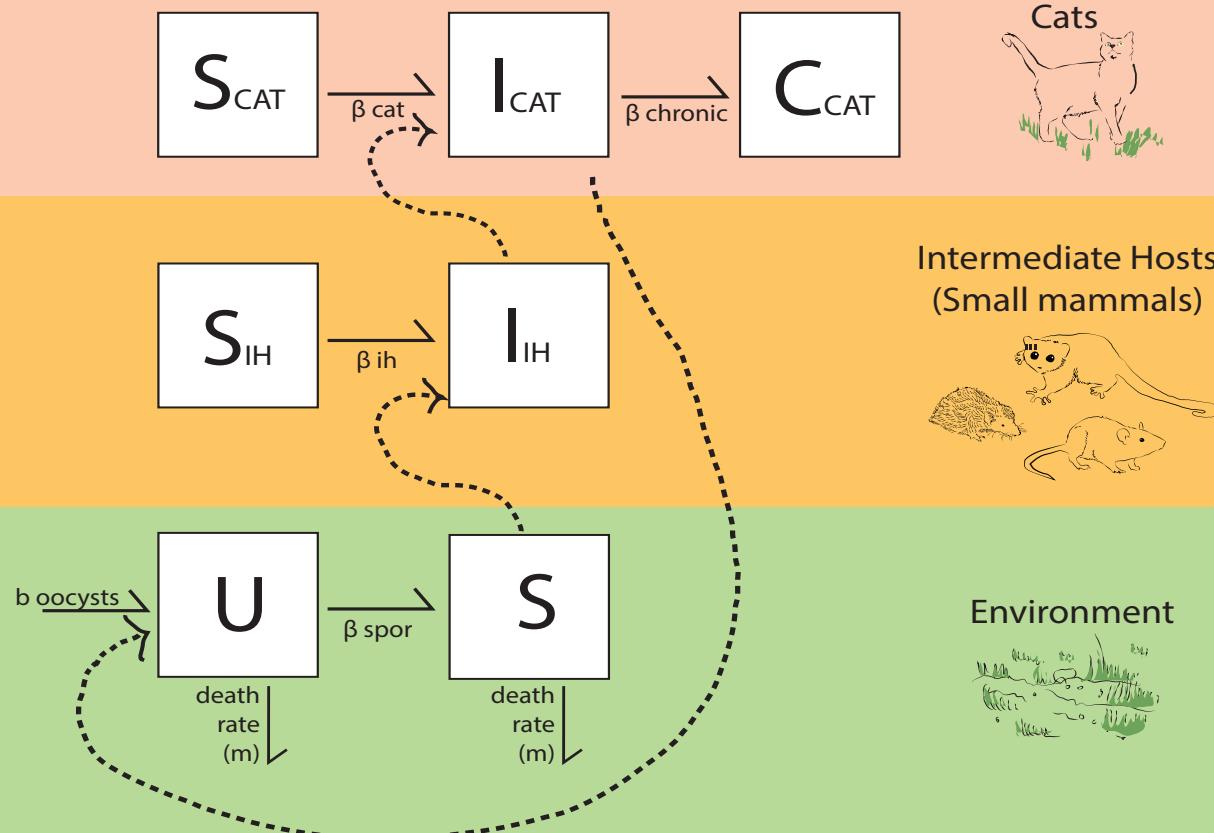
glmmML(toxo.infection~B1+B2+B3, family=binomial, data=datum, cluster=site)

> Binomial (infected or not)

> Predict that infection will increase with cat occupancy, and also positively associated with soil moisture and temperature

> Plan to collect serum samples from native small mammals across already existing camera trap grid, measure soil temperature and moisture, and categorically score level of habitat fragmentation

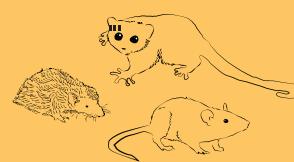
Mechanistic Question: Which is more important in determining *T. gondii* intermediate host infection, oocyst sporulation and survival or cat occupancy?



Scat: susceptible cats
 Icat: infected cat
 Ccat: chronic infection



Sih: susceptible intermediate host
 Iih: infected intermediate host



U: unsporulated oocyst
 S: sporulated oocyst



Next Steps!

- >Conduct small mammal trapping in Andasibe in July-August 2019
- >Collect realistic parameters (# of oocysts shed per infected cat, influence of soil and moisture on oocyst survivorship, etc) from the literature to run the mechanistic model
- >Test for prevalence of parasites in soil samples and intermediate hosts, including others relevant to human and wildlife health such as *Trichuris* and *Toxocara* spp.

