**Lab 7**

In this lab, we will practice identifying fixed and random effects within the context of research questions, statistical hypotheses, and experimental design. For this activity, please pick one published peer-reviewed article in your field (or something you don’t mind reading) that uses a (generalized) linear mixed model in their statistical analysis. Make sure to include the citation for the article, and use it to answer the questions below. If your article includes more than one mixed model, just pick your favorite one for this lab. 2 points each question. 16 points total.

Full citation of your research article: Rafferty NE, Agnew L, Nabity PD. Parasitism modifies the direct effects of warming on a hemiparasite and its host. PLoS One. 2019 Oct 30;14(10):e0224482. doi: 10.1371/journal.pone.0224482. PMID: 31665151; PMCID: PMC6821401.

1. **What is the research question or scientific hypothesis that the authors are trying to address?**

* What is the direct and indirect effect of warming on parasitic plants (Castilleja Sulphurea)

1. **Briefly describe their experimental design (e.g. relevant treatments/sampling scheme, replication, response variable)**

* Treatments were as follows: Host alone, Parasite alone, host + parasite - > each treatment group was subject to an ambient and an elevated temperature treatment in two greenhouse bays.

1. **What is the response variable? Was it analyzed in a linear mixed model or a generalized linear mixed model?**

* The response variable was number of haustoria per hemiparasite and was anaylised in a generalized linear model with a Poisson distribution.

1. **Which are the fixed effects in this model? Why are they treated as fixed?**

* Temperature treatment, parasite-host presence. These effects are fixed as they are independent and represent the population of values.

1. **Which are the random effects in this model? Why are they treated as random?**

* Greenhouse bay (all not broken down by treatment). I am less sure about if there are any random factors as the study design was rather simple. I also see no evidence of pseudo replication

1. **What is the statistical null hypothesis?**

* No difference between warming treatments.

1. **What did the authors find and conclude from this analysis?**

* The authors find that haustoria formation was induced by warming in the presence of the host, however showed no significance between treatments when the hemiparasite was grown alone.

1. **Were there portions of their methods and results that you did not understand? If so, which parts? Since we have yet to cover mixed model implementation, it’s normal that you didn’t quite get everything. Hopefully the coming two weeks will address some of these questions.**

* The results of this paper was rather simple in comparison to others I looked at since they did a series of GLMs.