Notes 2

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Let's try to think about this more generally. We want to design and experiment for red queen hypothesis and perform power analysis.

1 Empirical studies

What I should be looking at:

- From Auld et al. (2016): "heritable component, rapid parasite evolution, and temporally shifting parasite-mediate selection"

1.1 Not Red queen?

- Michiels et al. (2001) says that their system does not match requirements of the red queen hypothesis (weak infection fitness cost). They think that there might be other factors involved.

2 Model

Michiels et al. (2001): heterozygote triploids are hard to distinguish so di-allelic representation is used

Lively (2001) suggests that prevalence is actually not a good measure. Risk of infection (probability of exposure to ifective parasite propagules) is a better measure. Near the *switch point*, asexuals can have higher prevalence but this range is fairly narrow.

Hakoyama and Iwasa (2004) tried to model Japanese crucian carp and showed that parasitism may explain the evolution of sex. They also show that coexistence of parthnogenetic complex is more likely than that of gynogenetic complex. Read this paper later to see how we want to analyze our model!

Neiman et al. (2017) emphasizes importance of a pluralist approach and suggests directions. It's worth noting that many of pluralist studies include red queen dynamics. We are being a pluralist because we're adding ecological feedback in the model. I don't think we have to test for power yet as there aren't many appropriate systems but it might still be important and interesting to compare power for pluralist idea vs. red queen alone. See Meirmans and Neiman (2006) for testing interactive effects.

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Study	Host	Parasite	Experiment	Notes
Michiels et al. (2001)	Flatworm *Schmidtea polychroa* - obligate sexual diploid and parthenogenetic triploid	Amoeboid protozoan (Asexual)	Compare proportion of infected individuals in mixed samples with LRT; rate of infection	Highly heterogeneous spatial distribution; need longer study
Kumpulainen et al. (2004)	psychid moth	hymenopteran parasitoids	test prevalence of parasitoids	demonstrates cost of sex; no evidence for different reproduction mode preferring different space
Bruvo et al. (2007)	Planarian flatworm *Schmidtea polychroa* - diploid sexuals and (mostly) triploid parthenogens	only look at asexual; test for infection rates among the clonal lineage; relate parasite load and fertility		
Verhoeven and Biere (2013)	Dandelions - diploid sexual and triploid obligate apomicts	Microbial communities, fungus, and weevil	Experiment + testing infection prevalence in nature	See geographic parthenogenesis; they address that they might have a power problem
Šimková et al. (2013)	Gibel carp - sexual diploid and gynogenetic triploid	metazoan parasites	Comparison of MHC genes: do sexual individuals have higher variability + do asexual invidiauls suffer from higher parasite load	"Coexistence may be maintained by male mate choice or spatial and temporal extinction and recolonization"; need longer study
Auld et al. (2016)	Daphnia - partly sexual and asexual	*Pasteuria ramosa*	Time shift experiment (testing for proportion of infected and spores per host) with MCMCglmm	Unrealistic setting in nature; their study looks at within-host factors
Slowinski et al. (2016)	*Caenorhabditis elegans* - hermaphrodite and obligate sexual	*Serratia marcescens*	Introduction of mixed mating into outcrossing population and exposing different types of parasites - test selfing rates using ANOVA	parasite has to be coevolving