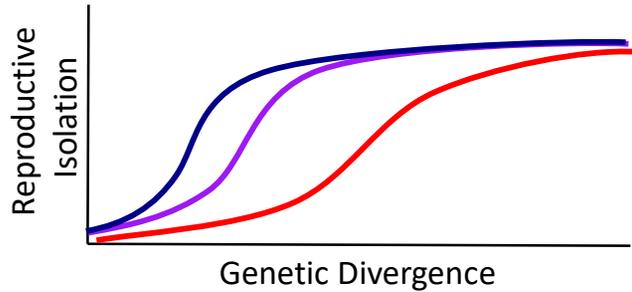


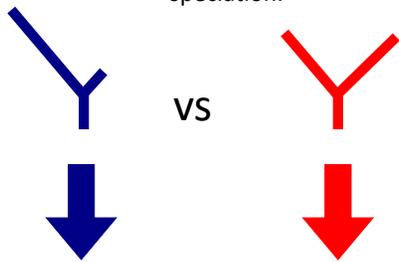
Asymmetric divergence leads to faster speciation

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Introduction:



As populations diverge, Reproductive Isolation is expected to develop between them due to Dobzhansky-Muller Incompatibilities (DMIs). But for the same genetic distance between two populations, the rate of evolution may be asymmetric between the populations. Some theoretical results (Dagilis et al 2019) suggest that this should impact the rate of speciation.



Few interactions between derived-derived mutations, but loss of co-adapted blocks of alleles in hybrids

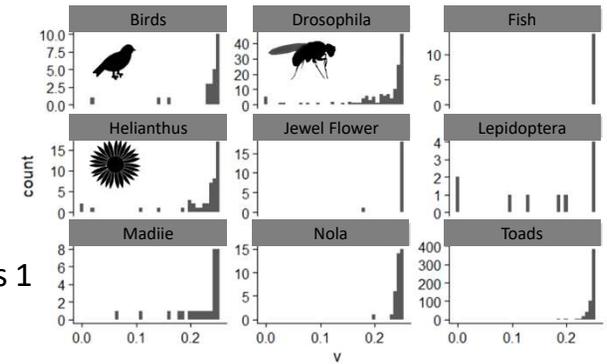
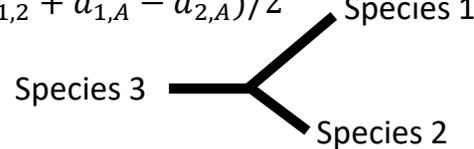
Hybrids experiencing both derived-derived mutation interactions and loss of co-adapted sets of alleles.

Data:

I measure this asymmetry as a parameter v scaling from 0 when only one population is diverging to 0.25 when both evolve at equal rates and measure it across 9 datasets of reproductive isolation. v is simple to calculate if a third species is available to polarize divergence (d_{xy} – divergence between species 1 and 2).

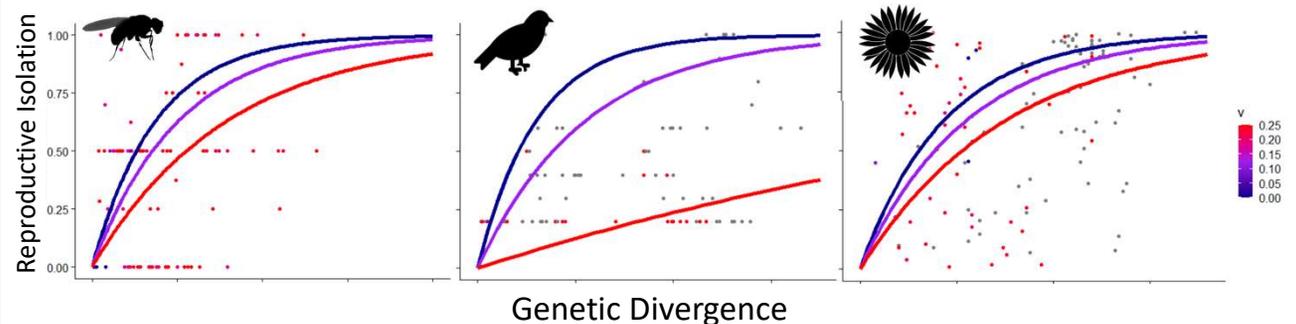
$$v = p_1(1 - p_1)$$

$$p_1 \equiv (d_{1,2} + d_{1,A} - d_{2,A})/2$$



Results:

We can fit models that either include or do not include v as a predictor on the rate of development of reproductive isolation. Models that include v are the best model for 6 of the 9 taxa (based on AIC scores), but resolution to detect importance of asymmetry is low when there's either very little data (Jewel flowers, Lepidoptera) or there's little variation in v (Fish, Toads, Nola). In the three clades with both decent sampling and some variation in v the following pattern is observed:



Points are species pairs with genetic distance (measured as Nei's D) on the x axis and degree of postzygotic reproductive isolation on the Y axis. The three curves are evaluations of the best fit model with equally quickly evolving taxa (red), one taxon evolving slightly faster (purple) or one taxon having all the substitutions between the two populations (dark blue). **Speciation is faster in all three taxa when only one population is evolving.**

Many caveats apply – would love to talk about those, so feel free to reach out!

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