Magallon paper

Crown group only includes extant species. Fossils before the node don’t matter, but dating that node is important for determining diversification rate

r hat in eq 3 means an ESTIMATE of the rate (of diversification)

Events that occur based on a rate like this will form a Poisson distribution

Crown groups with this diversification rate and in a pure birth model (yule model) should see exponential growth, diversification, speciation

In stem groups N(0) = 1, in crown groups it equals 2, leading to eqs 3 and 4

r = b – d (b = birth rate, d = extinction rate). In this case r can be negative but this doesn’t happen often because if d approaches 0 the species dies out

be careful of ascertain bias – nonextinct groups represent a biased set

Why is it important to consider both $ birth and deaths

Maddison Paper

Related to own research: could viruses diversify and “speciate” differently based on host?

Diversification rates along with regular rate of 0 🡪 1 will affect proportion of 0s and 1s. This adds another variable to account for in model

BiSSE assumes instantaneous 0 and 1 conversion

The data is the phylogeny (not just the tips but the entire tree)

At the root of the tree, calculate the probability/likelihood that it starts at 0 or 1

Appendix 2: equilibrium vs equal rates

Assumption of equilibrium – the state starts at equilibrium

Figure 4 shows using this for extinction rates can be dangerous. Reminder with Maddision/FitzJohn paper: traits may not be correlated

Beaulieu Paper

Does HiSSE model fix Maddison/FitzJohn problem? No, because it doesn’t take into account number of changes

Type 1 error can occur by picking a model that rejects the null but is wrong?

With a model, even if it gives a low p-value, compare with other models

Turnover rate in a population = birth rate – death rate

Extinction fraction: death rate/birth rate

Think about areas to consider in evolution/phylogeny that haven’t been covered in class that relate to project and look for modeling/approaching these areas