# Cenozoic mammals and the biology of extinction

Peter D. Smits
psmits@uchicago.edu

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Extinction is expected to be non-random with respect to biology. Determining how different traits, both alone or in concert, influence extinction risk is extremely important for understanding the differential diversification of taxa over the Phanerozoic. Traits relating to environmental preference are good candidates for modeling differential extinction because a simple expectation, based purely on stochastic grounds, is that taxa with a preference for rare environments will have a greater extinction risk than taxa which prefer abundant environments. Importantly, the Law of Constant Extinction posits that extinction risk is random with respect to taxon age. This statement has become increasingly under fire and its generality is possibly suspect. By fitting different theoretical distributions of survival to empirically observed durations, the generality of this statement can be tested.

Trait mediated survival was studied for the record of Cenozoic mammals using dietary and locomotor categories, as well as body size. These traits were selected because they relate directly with environmental preference. Analysis was conducted at both the generic and specific level. Preliminary results from analysis of specific level survival as predicted from dietary and locomotor categories indicated that North American and European mammals had fundamentally different patterns of taxon duration. North American species survival was best predicted by locomotor category while European species survival was best predicted by dietary category. Also, the distribution of North American species durations was best modeled as exponentially distributed (constant extinction risk) while European species durations were better modeled by a Weibull distribution (monotonic nonconstant extinction risk). While there are many further and necessary refinements for this analysis, these preliminary results do highlight how regional level processes may shape taxonomic patterns in fundamentally different ways.