

Gambling with Australian brachiopods

Understanding the differential extinction of taxa is one of the primary goals of paleobiology. Extinction can be thought of as a Gambler's Ruin type process, with the eventual disappearance of a taxon being inevitable regardless of the odds of "winning" or "losing". What is of interest, instead, is how long it takes for a gambler to go "bust". We can imagine a genus as a "gambler" with its constituent species as betting pieces. The properties of both the genus and the species affect the odds of going "bust" (extinct). By comparing genera with similar properties to those with different, it is possible to estimate how these properties may "tip the scales" of generic extinction risk.

Using the Australian record of Permian brachiopods various factors which might contribute to the longevity of taxa during periods of low intensity (i.e. background) extinction are compared. These factors include substrate and environmental preference, body size, and biogeographic occupancy. The effect of these factors on the distribution of taxonomic durations is analyzed in a parametric survival analytical framework. Additionally, occupancy is estimated using a biogeographic network approach. This particular fossil sequence was chosen because it represents a relatively complete and well worked sequence. Additionally, during the Permian the east coast of Australia faced the Panthalassic Ocean and may have represented a partially isolated biogeographic province. Additionally, by focusing on a specific region instead of the global record the analytical goal is to determine specific selection differences in an environment, *sensu* Simpson, as opposed to global patterns. In addition to biogeographic occupancy, the other studied factors are important components of the best predictors differential longevity. This implies that extinction in brachiopods does not follow a completely Field Bullets mode, but is partially selective with respect to biology.