**The Red Queen and the Court Jester: Species Diversity and the Role of Biotic and Abiotic Factors Through Time**

**Michael J. Benton**

In this article, Benton explores the two overarching models that try to describe the causes of evolution. The model that describes biotic factors that cause evolution is called the Red Queen model which boils down to running just to stay in place. The model that describes abiotic factors that cause evolution is the Court Jester model which is essentially that unpredictable changes in the physical environment lead to evolutionary changes. These two models are not mutually exclusive, and according to this article, they work at very different scales. Factors like competition can have an impact at a local level on geologically short time scales, but factors like a changing climate or landscape can have much more global and enduring impacts on diversity. The author reviewed several different studies and showed how they were related to the Red Queen, Court Jester, and a combination of the two called the multilevel mixed model. There were far too many to go into any detail about all of them, but I want to point out some that were of interest to me. He wrote about the latitudinal diversity gradient which is in reference to greater amounts of diversity in the tropics than in temperate or polar latitudes. Another interesting study used comparisons of sister taxa, two subgroups of antelopes, and testing of the resource-use hypothesis.

I liked that this article covered a wide range of topics in a fairly small amount of space and quite elegantly. It made me curious about many of the papers that were referenced, and some of the references might help me with my grant proposal. The study on the phylogenetic relationships of dinosaurs, and the subsequent clade expansion was interesting. The part of the paper that helped me out considerably was the short paragraph on the latitudinal diversity gradient. It actually made me rethink the justification for my hypothesis that I had for my grant proposal, and I think it will make it that much better. I like that he showed the impact that abiotic factors can have on biodiversity and related that to biotic factors as well. The pluralistic view of evolution makes much more sense than a singular cause.

There was not much that I did not like about this article. I do want to say that I find it very annoying when a scientist is stubborn and close-minded that their particular field contains all of the answers to a question. I see it in genetics, physics, statistics, and now in paleobiology and ecology. It works well to look at something with only one factor in mind in order to figure ways to test that, but it does not necessarily create a complete understanding of a phenomenon.

I feel like the figures were well done in this article and they offered a great graphical representation of what was said in the text. Figure 1 helped to show how the Red Queen and Court Jester models operated on different time scales and may have overlapping or confounding effects where it appears that the Red Queen model may have more influence when, in fact, it does not. Figure 2 was interesting, but I did not see what they referred to as the third plateau from the Pliocene to now since it just appears to be a peak on the red curve. Much of the article could essentially be distilled down into Table 1. It shows the relationship between the Red Queen and Court Jester models and how they overlap. Figure 3 was very interesting since I have often wondered about the phylogeny the basal archosaurs. It seems very complicated, but it seems interesting to see the morphospace graph even though I am not exactly sure what is being measured. I feel like that last graph could have been more clear.