The paper addresses the differences in theory and practice between ecologists and paleontologists, especially as they treat changes in biodiversity over time. Ecologists subscribe to the Red Queen model that assumes intrinsic factors drive speciation; paleontologists, however, work on the notion that evolution is forced externally. The two theories are scale-and-time dependent, with the Red Queen hypothesis being true on short timespans and local scales and the Court Jester hypothesis prevailing on long (geologic) timespans and on a regional-to-global scale. There is a third option, the multilevel hypothesis that posits either overlap or feedback between the two. Benton takes the taxic view of the two sides, meaning he considers the two hypotheses by how they affect species and genera as discrete entities. He concludes that the two hypotheses may dominate on different scales, and even possibly in different realms, with the Red Queen hypothesis holding true for marine ecosystems and the Court Jester scenario playing out on land.

I’ve encountered this debate before in previous geology classes (particularly on the relative importance of phosphorus or nitrogen in ocean fertilization—rather specific). However, I have never seen it resolved beyond a “we’re both right”, general synthesis. This conclusion feels intuitive, which gave me the false impression that their relative influence had been established. This paper puts more scrutiny on the two hypotheses, and I liked that the author situated the evidence for each hypothesis firmly in the geological record, without simply spewing examples devoid of context. I knew of all the geological examples he used, but I was interested to learn of their distinct biological signatures—for example, I knew about the Great American Interchange due to the silling of Panama, but I didn’t know that mammals were grouped into three clades based on their continental origin. I especially liked his dinosaur example, and felt that it was integrated well into the paper. He points out that the Mesozoic, especially the terrestrial record, indicates that the Court Jester theory may be dominant—the dinosaurs’ opportunistic invasion of niche space after the end-Triassic indicates that their success was driven by an external factor, while the older theory posited that the dinosaurs outcompeted their predecessors, followed an internal, biotic factor.

I would have liked to have seen more discussion about the multilevel hypothesis, as this was largely overlooked in favor of contrasting the Red Queen and Court Jester models. Would a multilevel hypothesis involve an overlap of the two, or simply a difference in scale (which is the most reasonable)? Are there any examples from the geologic record that express both? Of course the author was working with a limited space, but he ignored the third option completely even though his conclusion pointed to its existence! I was a little disappointed in this regard.

Several of the figures included “Milankovich timescales” on their y axes, which puzzled me. The author isn’t suggesting that Milankovich cycles were of any importance to either hypothesis, and it seems to be shorthand for briefer timespans. While it did help me to calibrate my sense of scale, it was a bit confusing and the axes could have been made more related to the data at hand. Figure 1A was informative and well-explained by the caption, but a line graph seemed like an odd choice for Figure 1B. What does “less” and “more” mean in terms of the x-axis, “environmental scale”? I’m also not sure I grasp the relationship it is trying to convey. Is it saying that the Red Queen model dominates short timespans over a large area, but only applies to small areas on a longer timespan? The caption does nothing to clarify this, either. Figure 2 was quite familiar, and fit in well with the portion of the paper that discussed marine equilibria and how it related to the Red Queen model. Figure 3 was well-formatted, and informative to look at, but was unrelated to the accompanying section on early dinosaur evolution. I would have liked to have seen a graphic done from the ERM model results, but alas it wasn’t included. The table was a useful summary of the three models and the evidence for each, but I was sorely disappointed that the only information on the multilevel hypothesis was found in this table and nowhere else.