Summary:

The introduction of this paper begins by stating that marine bivalves tend to originate in the tropics and the last occurrences tend to be in the extratropics. This can possibly be explained by a genus evolves and expands in a poleward direction. With these considerations, the paper sets out to answer four questions. First, whether or not there is a pattern of migration. Second, is it an expansion of geographic range or does the entire genus make a consistent migration. Third, are there large or small changes and are they linked to specific events. Finally, are these changes consistent through time. In order to answer these questions, several different statistical tests are used alongside with the data retrieved from the Paleobiology Database of marine bivalves and gastropods during the Cenozoic era. First, unimodal response curves are formed for different time periods within the Cenozoic in order to examine the latitudinal tolerance, prefered latitude parameter, and peak abundance for each taxon and correlation coefficients are used to compare these features. This study uses a Gaussian logistic regression. Once these are formed they have to be compared. Scatterplots are used to form best-fit regression lines that can be used to look at the overall trend of the drift, whether equatorward or poleward as well as expansion or contraction of tolerance. Pearson's correlation coefficient and least-squares linear regression are used. Lastly, the paper examines whether large or small changes occur in these time intervals. This is done by using bootstrapping to reconstruct a latitudinal gradient.

This paper manages to form conclusions on each of the four questions that it set out to answer. First, this study concluded that there was no trend of migration either poleward or equatorward. Contrary to prior belief, this study shows that the evidence is actually weakest to support the extratropical migration. The paper offers the explanation that while there is some expansion into the extratropics, the majority does not migrate and stays in the tropical setting.

Next, it concludes that shifts in preferred latitude is slightly larger than the shifts in latitude tolerance. Finally, this study concludes marine bivalves and gastropod shifts in the different parameters are fairly uniform over the time period that was studied. This shows that they do not respond significantly to environmental and biological changes that happen in the world around them.

Likes:

I thoroughly enjoyed both the structure and the writing of this paper. First, there is clarity and precision in the introduction. The paper methodically writes out the different goals that the study was going to attempt to achieve. After the goals were laid out, the paper told the reader exactly how it would go about answering these questions. With such a strong introduction, it was easy to follow the thought process of the paper as the reader goes through some of the more complex ideas and statistics that it uses. I also really like the fact that the author does a good job of explaining the statistical tests that were used. Specifically, when the paper discusses the GLR, it spells out exactly why this is the prefered regression. As someone with a limited statistical background, this explanation was extremely helpful. Finally, I liked that the paper gives a conclusion section that clearly lays out what it was able to determine. This is just another example of the clarity that the paper is able to provide.

Dislikes:

While I thought that the science and the statistical analysis of this paper was strong, I did have a problem with the scope of the paper. As I read the first couple of sentences in the introduction, I asked myself, why would this happen and is this a pattern that extends beyond bivalves and gastropods. While I believe this is beyond the scope of this paper naturally, I think

that it is the logical next step in this study. Therefore, I think these kinds of questions need to be at least suggested in the discussion section as a place where this study needs to be extended. This study simply answers "does this happen?" While this is a good first step, there needs to be more questions answered and it is the discussion section that should address this.

Figures:

Figure 1 shows an example of a latitudinal response curve. It breaks down the data that is displayed within the curve such as tolerance, preference, and peak abundance. Figure 2 displays the different scatterplots that compare preferred latitude and tolerance. It also shows the results of the statistical tests that were performed on these graphs. Figure 3 shows the curves that are a comparison of the preferred latitude and tolerance. Each curves are a comparison of adjacent epochs. Figure 4 is similar to Figure 3 but it instead compared Cenozoic stages. Finally, Figure 5 is a histogram that displays the occurrences in each epoch. I found each graph easy to read and I found the explanation under each figure as helpful to understanding each feature of the figures. The only problem I had is that Figures 3 and 4 seemed like they might be a little cluttered, having too many curves.