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Reading #7

Title: The influence of lithification on Cenozoic marine biodiversity trends

Author: Austin J. W. Hendy, 2008

Summary: This paper aims to investigate and suggest a possible explanation for the biases and missing pieces that exist in the fossil record by looking at the sediments which house the fossils. The author defines alpha diversity, which monitors the median diversity of individual communities through time, and suggests that it may prove a useful tool for measuring biodiversity because it may help avoid biases. Previous research has shown that global diversity exponentially rises through the Mesozoic-Cenozoic relative to the Paleozoic, a pattern that is repeated in marine benthic communities as well. After adjusting for other factors such as environmental coverage and latitude variation, this diversity could be even higher. The author argues that a comparison of the alpha diversity should constrained geographically in order to meaningfully study the effects of lithification on fossil preservation and his dataset comes from brachiopods and mollusks in the late Miocene-Pleistocene of New Zealand. The samples were divided into groups of unlithified, poorly lithified, and lithified and compared with occurrence data gathered from the New Zealand Fossil Record Database. The mineralogy was also an important aspect that was tested for in order to determine the chemical effect of the lithification process. The results show a clear increase in diversity in the unlithified sediment as opposed to the well-cemented sediment. The author suggests that this is because of the preferential destruction of aragonitic skeletal hard parts which is dissolved during carbonate diagenesis. This study shows that diversity may show an increase in the Cenozoic because of the abundance of younger unlithified sediments.

What I liked about this paper: I really liked this paper in comparison to many of the others that we’ve read so far in class. I liked that the methods were so clearly laid out and all of the terms were defined and explained as, for example, the author explained what he meant by lithified, poorly lithified, and unlithified. I also think that the study is thorough because the author also included a discussion about the mineralogy of the fossils. One thing I would be curious to know about is whether his results hold true for vertebrate fossils which do not have aragonite skeletons. Does vertebrate diversity also decrease with increasing lithification?

What I disliked: I really liked this paper and I don’t have much critique. I only think that the author could have mentioned another group of organisms besides those with only calcite-aragonite skeletons for a better picture of what the overall data would look like.

Diagrams: The diagrams were very clear and the author made use of different types, including tables, charts and bar graphs. These quickly and easily show the results. I also think that a map showing the locations of the fossils or a little more discussion (or diagram) on the specific lithology of the formations from which they came may have been helpful as well.