Microevolutionary Response in Lower Mississippian Camerate Crinoids to Predatory Pressures

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Hypothesis: The presence of new species in the fossil record during the Lower Mississippian indicates a significant change in ecological conditions. This hypothesis is supported by the observed change in plate convexity and spine length in different species, which suggests that these changes are representative of microevolutionary change as new species evolve to changing ecological conditions.

Methods

- A new method to determine convexity has been designed and applied to assign a numerical value to the convexity of morphological characteristics. This method was applied to the calcite plates that make up the skeletons of the crinoids to assign a numerical value to the convexity of these plates.
- First images are edited in preparation for algorithm. See Fig. 1.

Algorithm is then used to model plate of specimens. Fig. 2 and Fig. 3

\[ I = \text{Modelled Plate} \]

\[ x = \text{Modelled Crinoid Plate} \]

\[ T = \text{Fig. 2 and Fig. 3} \]

Fig. 3: Curve of Best Fit for Modeled Plate

Fig. 4: Intraspecific Variability of Convexity in Agaricocrinus americanus

Fig. 5: Intraspecific Variability of Plate Convexity in Agaricocrinus crassus

Fig. 6: Intraspecific Variability in Spine Length of Dorycrinus unicorns

Future work

Much data must still be refined from image format to numerical format. Once this is done, intraspecific variability of plate convexity will be determined for Agaricocrinus. When intraspecific variability has been determined, change in different species through time will be examined using a runs test to determine whether trends exist or are random. Similar tests will be performed on Agaricocrinus to determine if trends in convexity exist in this genus as well. Spine length in Dorycrinus will then be examined with a runs test to examine morphological trends through the Lower Mississippian. Change in plate convexity in different species is representative of microevolutionary change as new species evolve to changing ecological conditions. Scaffold et al. (2011) proposed a model of evolutionary change at the genus level in crinoid crinoids through the Mesozoic period, and, if such a link exists at the species level, it will suggest a connection between microevolution and macroevolution, which is questioned by those (Gould, 2002) who envision a hierarchy in evolutionary processes.

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References
