

## **Statement of Research Interests and Philosophy**

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Research is an integral part of my academic experience and career goals. It enhances my personal knowledge base and adds to the general understanding of complex subjects. Research can forge much-needed connections between disciplines, and it enriches the educational experience for students. Topically, my research addresses broad questions of paleoecology during the Mesozoic Era, and focuses specifically on the dynamics of primary productivity, secondary productivity, and herbivory in past ecosystems. Philosophically, my research goals center around the inclusion of students and diverse academic points of view, and on applying modern experimental techniques to questions of a paleoecological nature in a scientifically rigorous manner.

Currently, my research interests include inquiries into the following: Rates of primary productivity in past ecosystems, experimental measurement of physiological parameters of living members of fossil plant groups, the environmental and ecological factors that favored gigantism in dinosaurs, the digestive physiology of extinct large-bodied herbivores, the evolution and ecological advantages and disadvantages incurred by herbivory, and the aerial distribution of highly digestible and difficult to digest food plants during past ecosystems and how this distribution might have effected the fauna. To study these dynamics, I employ a mixture of modern experimental studies with fossil proxy and mathematical model data in a statistically and scientifically rigorous manner.

While my Ph.D. research has been narrowly focused in time on the Late Jurassic and Early Cretaceous Periods, when atmospheric carbon dioxide and oxygen were concurrently enriched, I am excited at the prospect of broadening my focus to include both the Paleozoic Era and the near future. In the Paleozoic Era, my interest lies in examining the effects of anomalous atmospheric compositions, such as the high atmospheric oxygen concentration surrounding the Carboniferous/ Permian boundary, on ancient plant physiology. I am also interested in examining the links connecting productivity and plant physiology with evolution and secondary productivity during times of high floral and faunal diversification rates. My interest in studying what will happen in the future lies with the fact that I am concerned with the effects of rapid increases in atmospheric carbon dioxide on global food quality and productivity. I am interested in investigating possible mechanisms or horticultural practices that could be used to mediate the loss of nutrients in food plants due to globally elevated carbon dioxide levels in the near future.

As a graduate of a small liberal arts college, I recognize the highly beneficial value of an undergraduate research experience for a student in deciding to pursue a scientific career. I also recognize that research is enriched both by students and by professors from unrelated fields who can bring fresh opinions and points of view to the project. Hence, it is important to me that I conduct collaborative research that allows me to work with specialists in a variety of fields, as well as to include students in the research process.

Scientific inquiry advances through a mixture of asking intriguing questions and performing scientifically rigorous and repeatable experimental studies. It is important to

me that I contribute to the advancement of my field of science by tackling interesting questions with innovative methods and by elevating the statistical and scientific rigor of that field both through my own research and through the education of students who will become informed citizens and members of the next generation of researchers.