The co-evolution of plants and mammals examined

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A report at the 2012 Annual Meeting of the Society of Vertebrate Paleontology in Raleigh, North Carolina, explores the idea that the evolution of flowering plants (angiosperms) during the Cretaceous Period had a profound effect on the early diversification of mammals during the same time frame. Paleontologists investigate life on earth, often discovering and describing new forms and evolutionary sequences from the depths of time. Questions about the co-evolution of ecologically-connected groups, however, can be particularly challenging to answer. A new report by David Grossnickle, a graduate student at the University of Indiana Bloomington, presents an elegant study that correlates the fossil record of the mid-Cretaceous flowering plants with concurrent patterns of mammalian evolution.

Grossnickle, a former high school biology teacher, notes that fossil discoveries of mid-Cretaceous mammals by a large number of paleontologists during the past 30 years have made his study possible. He has assembled those discoveries and looked at the number of species through time, and also measured their teeth to understand the range of body sizes and functions, and quantifying the shapes of their jaws to recognize changes that might reflect dietary habits. Grossnickle points out that his novel approach is a "first-of-its-kind paleontological examination of mammal morphological, taxonomic and dietary changes during the mid-Cretaceous flowering plant radiation."

The results of Grossnickle's work do not tell a simple story, although it is clear that there were significant changes among mammals in the mid-

Cretaceous. More specifically, some groups decreased in variety while others show an increase in number of species. Those that increased in diversity were insectivorous, while another group showed a marked shift towards herbivory, though this shift may have been delayed until after the flowering plants had already diversified. The success of mammalian insectivores and eventual rise of herbivores is perhaps a response to the new ecological niches that came with flowers, fruits and the insects that frequented them. Grossnickle's work has opened a new chapter in our understanding of the complexity of the co-evolution of flowering plants and early mammals. As he puts it, "this conclusion may cause us to modify our understanding of how angiosperms initially affected mammals."

Dr. David Polly, Grossnickle's major advisor at the University of Indiana Bloomington, comments that the strength of Grossnickle's work is that "he examined not only the waxing and waning of the diversity of mammals and plants, but also one of the primary traits that link them, the jaws and teeth of the mammals." Polly explains that Grossnickle "was able to define a metrics for insect eaters, meat eaters, seed eaters and leaf eaters using living mammals, then show how the Mesozoic mammals expanded into the leaf eating category as the diversity of angiosperms changed."

In short, we cannot ignore the role of plants in the early stages of mammalian evolution, and hence the evolutionary trajectory of our own lineage. Without the radiation of flowering plants during the Cretaceous, the world would be a very different place, and it would have been unlikely to have generated clever primates figuring out ways to reconstruct the interconnected ecological history that binds together all living things.

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