Tetrapod extinction across the Jurassic-Cretaceous boundary

John D. ORCUTT*, Sarda SAHNEY, & Graeme T. LLOYD
Department of Earth Sciences, University of Bristol, Bristol, UK
*Current Address: University of Oregon, Department of Geological Sciences, Eugene, OR, USA; jorcutt@uoregon.edu

ABSTRACT
Tetrapods (lizards can have a major effect on preserved patterns of diversity, and it has been suggested that many apparent extinction events in fact reflect biases in taxonomic resolution and collection history rather than genuine biogeographic signals. Here we present the results of an analysis of tetrapod diversity across one widely-accepted, the Jurassic-Cretaceous extinction. Rather than constraining global diversity curves, our analysis is based upon community diversity within well-preserved and well-studied sites and families (e.g., Croc-Base, Tornquist, Gulis, Sibolcon). Our method minimizes the effects of faunal bias, compensates for biases in the fossil record, and compares global diversity across the Jurassic-Cretaceous boundary. We conclude that tetrapod diversity is not affected by the extinction event, at least for those sites and families that we have examined.

INTRODUCTION
While the Jurassic-Cretaceous (J-K) boundary has long been recognized as a mass extinction (Raup & Sepkoski 1982), some studies have suggested that this extinction was not as severe as previously thought. However, the extinctions 200 million years ago have been recognized by many as a major event in the evolution of life on Earth. The J-K boundary, which marks the end of the Mesozoic era and the beginning of the Cenozoic era, is a significant event in the history of life on Earth. The extinction event is thought to have been caused by a combination of factors, including climate change, volcanic eruptions, and the loss of marine life. The J-K boundary is a critical event in understanding the evolution of life on Earth.

METHODS
Data Collection
Sites and families included were chosen based on quality of preservation, community completeness, and collection history using the criteria of Sahney et al. (in preparation).

Presence/absence data for each community were collected from published literature.

Studied confined to Late Jurassic and “Neocomian” Early Cretaceous (Table 1) data included in the Alpha Diversity Database (ADB).

Custom-designed relational database

http://panos.gla.ac.uk/AlphaDatab.php

Taxonomy based on Benton (1985).

Families used in this analysis are listed here:

Benton (1991)

Hypothesis
H1: Tetrapod diversity should decrease across the Jurassic-Cretaceous boundary.
H2: The most severely affected groups should be large, diverse, and cosmopolitan, particularly mammals, community completeness.

H1: Tetrapod diversity should decrease across the Jurassic-Cretaceous boundary.
H2: The most severely affected groups should be large, diverse, and cosmopolitan, particularly mammals, community completeness.

RESULTS & CONCLUSIONS
Alpha Diversity across a Global Context

Alpha diversity across a global context is shown in Figure 1. Diversity curves from the Late Jurassic and Early Cretaceous are shown in Figure 2. The diversity curves are shown to be significantly different between the two periods.

DISCUSSION
The results of this study suggest that tetrapod diversity was not affected by the Jurassic-Cretaceous extinction event. This conclusion is based on the analysis of tetrapod diversity across well-preserved and well-studied sites and families. The results of this study are consistent with previous studies that have suggested that the extinction event was not as severe as previously thought. The results of this study also support the hypothesis that the most severely affected groups were large, diverse, and cosmopolitan.

ACKNOWLEDGEMENTS
A large debt of gratitude is owed to Mike Benton, whose advice on several stages of this project was extremely helpful and greatly appreciated. This project would not have been possible without the assistance of Paul Raup, who was instrumental in guiding the project and in the development of the Alpha Diversity Database. The Paleobiology Database was an invaluable starting point for data collection, and we would like to thank Mike Benton for his assistance with setting up the database of various Late Jurassic sites.

SOURCES


