

Plants and the K-T Boundary

The Cretaceous Period of geologic time ended abruptly about 65 million years ago with global extinctions of life in the sea and on land – most probably caused by a catastrophic meteorite impact. Although much popular interest has focused on the fate of the dinosaurs at that time, the plants that existed in Cretaceous time also underwent extensive and permanent changes, and they reveal much more about the nature of this devastating event.

In *Plants and the K-T Boundary*, two of the world's leading experts in the fields of palynology and paleobotany integrate historical records and the latest research to provide a comprehensive account of the fate of land plants during this 'great extinction.' The book begins with chapters on how the geological time boundary between the Cretaceous and Paleogene periods (the K-T boundary) is recognized with varying degrees of resolution, and how fossil plants can be used to understand global events some 65 million years ago. Subsequent chapters present detailed evidence from case studies in over 100 localities around the world, including North America, China, Russia, and New Zealand. The book concludes with an evaluation of the various scenarios for the cause of the K-T boundary event and its effects on floras of the past and the present.

This book is written for researchers and students in paleontology, botany, geology, and Earth history, and will be of interest to everyone who has been following the course of the extinction debate and the K-T boundary paradigm shift.

DOUGLAS J. NICHOLS is a Research Associate with the Department of Earth Sciences at the Denver Museum of Nature & Science and a Scientist Emeritus with the United States Geological Survey (USGS). He received his Ph.D. in geology from The Pennsylvania State University before pursuing a career that has included university teaching, the oil industry, and 30 years of research with the USGS. Dr Nichols is a palynologist, with research interests in the fossil pollen and spores of Upper Cretaceous and Paleogene rocks, with emphasis on biostratigraphy, paleoecology, evolution, and extinction events. In 2005 he

received the Meritorious Service Award from the US Department of the Interior for his research on the biostratigraphy of nonmarine rocks and the Cretaceous-Paleogene (K-T) boundary in western North America. Dr Nichols is the author or coauthor of more than 140 scientific papers and has served as editor of the journals *Palynology* and *Cretaceous Research*.

KIRK R. JOHNSON is Vice President of Research & Collections and Chief Curator at the Denver Museum of Nature & Science (DMNS). He joined the DMNS in 1991 after earning his doctorate in geology and paleobotany at Yale University. Dr Johnson's research focuses on Late Cretaceous and early Paleogene fossil plants and landscapes of the Rocky Mountain region and is best known for his research on fossil plants, which is widely accepted as some of the most convincing support for the theory that an asteroid impact caused the extinction of the dinosaurs. He has published many popular and scientific articles on topics ranging from fossil plants and modern rainforests to the ecology of whales and walrus, and coauthored the books *Prehistoric Journey: A History of Life on Earth* and *Cruisin' the Fossil Freeway*.

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DOUGLAS J. NICHOLS¹

AND

KIRK R. JOHNSON²

Denver Museum of Nature & Science

¹ Research Associate

² Chief Curator & Vice President for Collections and Research



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Dedicated in loving memory to
Beatrice Olmstead Nichols
who never doubted her son would go far
but perhaps did not envision travels eons back in time
and
Katie Jo Johnson
who was always amused that the son of a Katie
would study the K-T boundary

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Preface

We both have been fascinated by the Cretaceous–Paleogene (K–T) boundary since the late 1970s. The Alvarez discovery galvanized our individual research efforts and we have worked together on this problem since we met in 1983. Our research has focused on western North America, so our data and interpretations are largely based on field work and laboratory analyses in this region. We have also studied terrestrial K–T boundary sections in Russia, China, and New Zealand and searched, unsuccessfully, for them in Mongolia, Patagonia, and India.

In preparation for writing this book, we made a comprehensive survey of the world's scientific literature through 2006 pertaining to plants and the K–T boundary. Our bibliographic database includes more than 500 references, but we have chosen to cite only those most relevant to understanding the effects of the terminal Cretaceous event on plants. We sought to interpret objectively the data available in those publications rather than simply to repeat the conclusions of the original authors. In many instances we agree with the original authors, but in some we do not. In the latter instances, we trust we have fairly presented their views and that we have given no reason for offense in our reinterpretation.

To present a major conclusion at the outset, we deduce that the changes in plant communities that took place at the K–T boundary are inextricably and causally linked to the impact of an extraterrestrial body on the Earth in the Caribbean region – the Chicxulub impact. The events that transpired in latest Cretaceous and earliest Paleogene time are much more complex than this statement suggests, however. We invite the reader to explore this fascinating subject with us.

We gratefully acknowledge the support and assistance of many colleagues over the last 25 years for their insights, inspiration, and collaborations in reference to the terrestrial K–T boundary. Specifically, we thank Walter Alvarez, David Archibald, Frank Asaro, Moses Attrep Jr., Richard Barclay, Edward Belt, Samuel

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DOUGLAS J. NICHOLS
KIRK R. JOHNSON