Available online at www.sciencedirect.com
SCIENCE DIRECT®
ELSEVIER
Palaeogeography, Palaeoclimatology, Palaeoecology 214 (2004) 179–180
PALAEO
www.elsevier.com/locate/palaeo

Editorial

Mesozoic–Cenozoic bioevents

The set of papers in this issue is a selection of results presented in a workshop on "Mesozoic–Cenozoic Bioevents" held in Berlin in late 2002. This workshop was organized in the framework of a 6-year graduate research program on "Evolutionary Transformations and Mass Extinctions". This interdisciplinary research program is analysing patterns and processes of major evolutionary changes in the Phanerozoic. Although the program comprises zoological, palaeontological and mineralogical research groups, the workshop was largely devoted to the fossil record of bioevents and thus the contributions in this issue focus on palaeobiological results. New analyses on the end-Cretaceous (K–T) mass extinction and the Eocene–Oligocene (E–O) transition are presented and long-term evolutionary patterns through the Cretaceous and Cenozoic are explored.

The contribution of Kriwet and Benton (*Neoselachian diversity across the Cretaceous–Tertiary boundary*) provides information on a severe extinction in modern sharks and rays at the K–T boundary. One third of all genera, which have been reported from more than one stratigraphic interval, have disappeared by the end of the Cretaceous. Although evidence for selective extinctions is tentative, the data suggest that shallow neritic and abyssopelagic forms where least affected.

Analysis of a geographic database on late Campanian to late Paleocene scleractinian corals (Kiessling and Baron-Szabo: *Extinction and recovery patterns of scleractinian corals across the Cretaceous–Tertiary boundary*) indicates that extinctions in corals were surprisingly modest and geographically nearly uniform. However, the previously observed difference in extinction rates between corals with inferred photosymbiosis and corals that lacked photosymbionts is confirmed, suggesting that extinction was highly selective ecologically and nutrition mode was probably a biological key factor in the K–T extinction.

In an essay on the end-Cretaceous dinosaur extinctions Buffetaut (*Polar dinosaurs and the question of dinosaur extinction*) points out that non-feathered dinosaurs, major victims of the K–T extinctions, were climatically much less constrained than other reptiles, which crossed the boundary relatively unscathed. Consequently the pattern of vertebrate extinction does not agree with climate change neither long-term, nor short-term (as part of the impact scenario).

Hansen, Kelley and Haasl use a comparative approach to mass extinctions (*Paleoecological patterns in molluscan extinctions and recoveries*). They compare the K–T and E–O extinctions in selected outcrops of North America and note profound differences, especially in the recovery pattern. Although based on local sections, their results have great potential for future analyses, because they show that ecological patterns may provide much more useful information than the usual head-count approach.

Moving further away from traditional diversity patterns, Schumacher and Lazarus (*Regional differences in pelagic productivity in the late Eocene to early Oligocene*) look at one of the presumed primary environmental causes of biologic change by examining changes of oceanic bioproductivity through the Eocene–Oligocene transition. Their most important point is that an increase in productivity through the

0031-0182/$ - see front matter
doi:10.1016/j.palaeo.2004.02.048

boundary is only observed in high latitudes, while low latitudes show almost no change. Although preliminary, their data might suggest that also gross environmental change was concentrated in high latitudes.

The analyses of long-term trends is also crucial to detail the role of bioevents. Two studies focus on long term patterns in the Cretaceous and in the Cenozoic. Villier and Navarro (*Biodiversity dynamics and their driving factors during the Cretaceous diversification of Spatangoida* (Echinoidea, Echinodermata)) critically analyse the potential bias in the recorded diversity patterns of Cretaceous sea urchins. They provide new methods to separate sampling bias from evolutionary signals and convincingly show that the diversification of spatangoid echinoids throughout the Cretaceous is a real evolutionary trend.

Prothero qualitatively demonstrates that long-term diversity dynamics of North American Cenozoic mammals are unlikely to be simply controlled by extrinsic forces such as climate change, bolide impacts or volcanism. He suggests that intrinsic (biologic) factors may instead be more important in the evolution of the group, illustrating that not all patterns of change in the fossil record can, or need be, explained by physical environmental change.

If there is a consensus it is that the factors causing biotic change in geologic time are complex, and are not generally reducable to single factors, or to simple one to one patterns of cause and response (e.g., direct linear correlation between temperature change and evolutionary turnover). Nor do major turnover events always much resemble each other—the K–T and E–O events show very different patterns, which reflect different complexes of presumed causes. To some extent this is a satisfying result, in that patterns of biologic adaptation and distribution in the modern world are also complex, and thus we suspect that the palaeobiologic research program is at least broadly on the right track. It also of course is a call for more interdisciplinary work, and is thus very much in the spirit of the graduate college that hosted this meeting in the first place.

Acknowledgements

We thank the Deutsche Forschungsgemeinschaft (DFG) for financing the workshop (Graduate Research Program #503). As always the reviewers put a lot of work in commenting on the submitted manuscripts. We sincerely acknowledge the efforts of Martin Aberhan (Humboldt-University, Berlin), Wolfgang Berger (Scripps Institution of Oceanography), Lionel Cavin (Natural History Museum, London), James Crampton (Institute of Geological & Nuclear Sciences, Lower Hutt, New Zealand), Mikael Fortelius (University of Helsinki), Linda Ivany (Syracuse University, New York), David Jablonski (University of Chicago), Barbara Mohr (Humboldt-University, Berlin), Thomas Rich (Museum of Victoria), Brian Rosen (Natural History Museum, London), Martin Sander (University of Bonn), Ellen Thomas (Wesleyan University, Connecticut) and Charlie Underwood (Birkbeck College, London). They all helped to considerably improve the papers.

Wolfgang Kiessling*
David Lazarus
Institute of Palaeontology,
Museum of Natural History,
Humboldt-University Berlin,
Invalidenstr. 43, 10115 Berlin, Germany
E-mail address:
Wolfgang.Kiessling@museum.hu-berlin.de.
*Corresponding author.

Ulrich Zeller
Institute of Systematic Zoology,
Museum of Natural History,
Humboldt-University Berlin,
Invalidenstr. 43, 10115 Berlin, Germany

Received 2 June 2003