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CULVER, S. J. & RAWSON, P. F. (eds) 2000. *Biotic Response to Global Change. The Last 145 Million Years.* xiii+501 pp. Cambridge, New York, Melbourne: Cambridge University Press. Price £60.00, US $95.00 (hard covers). ISBN 0 521 66304 0.

At a time when positions are disappearing and research dollars are drying up, geologists and palaeontologists around the world have begun to realize that there is a market for their skills and expertise under the rubric of 'global climatic change'. Oil companies and universities no longer hire many palaeontologists, or fund their studies under conventional research programs, but some have been quick to realize that the fossil record provides a unique perspective on the past history of global climatic change, and that this bandwagon may help keep the profession alive. Several major NSF-sponsored programs on global change are now planned or in existence. In 1994, the Palaeontology Department of the Natural History Museum of London and the Department of Geological Sciences at University College London sponsored a joint research programme, 'Global Change and the Biosphere'. The organizers and editors were foraminifer specialist Steve Culver (then at the Natural History Museum, but now back home in the US at East Carolina University) and ammonite palaeontologist Peter Rawson (of University College London). They realized that the best opportunity for palaeontology to shed light on global climate change is the time interval of the last 145 million years, or of the Cretaceous (with its 'greenhouse' climate) and Cenozoic (when the 'greenhouse' developed into the present 'ice-house'). Not only is the geologic record of this interval much better known with much higher resolution and better dating

than older intervals, but in addition most of the organisms belong to modern groups, allowing a greater degree of confidence in palaeoecological reconstructions based on living analogues.

This volume is the product of that 1994 conference. After a brief introduction by the editors, there are two chapters giving a synoptic overview of the climatic and biotic events of the Cretaceous (by Andrew Gale) and the Cenozoic (by Kevin Pickering). Although these chapters are well written and clear, they suffer from a problem that is endemic to the book: they became outdated by the long publication delay. The conference was held in 1994, and it appears that the authors were last given a chance to update their work in 1996 (judging from the most recent dates in the bibliography) – yet the volume took four more years to publish. In the meanwhile, a lot of new research has been conducted on palaeoclimatic changes during the Cretaceous and Cenozoic. This is especially true of the explosion of information about the late Paleocene thermal event (barely mentioned here), our newer and much better understanding of the Eocene–Oligocene transition, and important recent insights, such as the impact of the closure of the Panamanian isthmus on global oceanic circulation and ultimately on the growth of the Arctic ice sheet. As the editor of several such symposium volumes, I'm fully aware of the difficulties of working with multiple authors, and then shepherding the process through often unwieldy publishing hurdles. However, a four-year delay from final revisions to bound copy is fatal for a volume that attempts to summarize such a rapidly changing research field. Authors and editors cannot do much about books that go out of date once they've appeared in print, but it is worse when a book is out of date *before* it appears in print!

The remainder of the book is mostly a taxon-by-taxon coverage of the biotic response of major groups to Cretaceous and Cenozoic climatic events. Here, the difficulties of having different authors covering widely diverse groups of plants and animals become apparent. Some chapters are highly detailed reviews of taxa that are very climatically sensitive, and can be sampled at very high resolution (such as many microfossil groups). Such databases allow the authors to talk with a great deal of confidence and detail about climatic changes and biotic responses. Other chapters deal with less climatically-sensitive groups, or groups with much lower sampling resolution, so one wonders what was the point of the inclusion of these topics in the volume. In other cases, the authors neglected data that would have been useful for understanding the response of their taxon to climatic change. For example, the chapter by Milner, Milner & Evans reviews the record of amphibians and reptiles through the last 145 million years, but fails to make much of Hutchison's (1982, 1992) work showing how sensitive they were to climatic change in North America. The chapter by Crame on the Bivalvia focuses on only the broadest phylogenetic and biogeographic trends, but work by Dockery (1986) and Hansen (1987, 1992) has shown that in some regions (such as the US Gulf Coast) the species-level changes in bivalves are highly reflective of climatic changes. The chapter by Hooker on mammals reflects the deterministic viewpoint that mammals faithfully track climatic changes (a view that I also held in 1994, as my work was also cited by Hooker). However, more recent higher-resolution dating of key climatic events, and closer study of the mammalian faunas in North America, have shown that North American mammals are relatively insensitive to major climatic changes, either in their palaeoecological responses, or as measured by proxies such as turnover rates, changes in dominance of certain groups, or changes in biogeographic ranges (Alroy, 1995, 1997, 1998; Prothero, 1999).

At a very general level, this volume is a useful overview of a wide variety of taxa, and contains a lot of useful information. For those conducting cutting-edge research on Cretaceous–Cenozoic organisms and climates, however, its factual base is so dated that it provides very little insight into the present or future direction of such research (which changed dramatically during the long publication delay). As such, it is a useful general reference for the scientist's shelf, but should not be counted on to provide the current thinking on many crucial topics. Today, scientists are no longer at the mercy of cumbersome publishing procedures. With a relatively inexpensive computer, a scanner, and printers' software such as QuarkXpress (and a slight investment in time), they can produce technical volumes entirely by themselves and ship them to the publisher ready for the printer. Perhaps with the advent of rapid publication of camera-ready manuscripts, it will be possible to circumvent some publication delays in the future, and turn out a more timely (and less costly, since this volume has only a few simple line illustrations) volume.

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