



Eocene Biodiversity: Unusual Occurrences and Rarely Sampled Habitats

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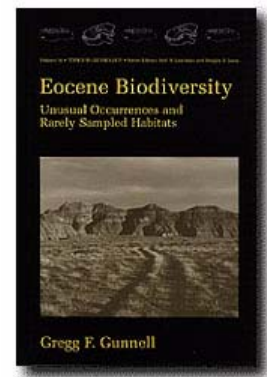
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The Eocene is a fascinating epoch, with an exceptional fossil record that documents the appearance and evolution of many groups of modern mammals and the decline of unique Paleocene animals, such as the uinatheres. During the Eocene global climates shifted rapidly, with several periods of global warming, which present us with obvious opportunities to study faunal and floral responses to shifting temperatures. However, in spite of the density of the terrestrial fossil record during this time interval from several continents, most discussion implicitly refers to the well-studied record from the western U.S. The papers collected in this volume attempt to broaden our knowledge of the Eocene by documenting uncommon depositional environments and areas outside of the 'classic' American Eocene localities in the Bighorn, Wind River, Green River, and Uinta Basins.

The volume is the result of a symposium held at the Society of Vertebrate Paleontology (SVP) meetings in Utah in 1998, and includes sixteen contributions. Of these, five deal with non-North American localities: the exceptional Messel oil shale, with chapters on the taphonomy

(Franzen) and paleobiology (Storch); the unusual kimberlite pipe fauna at Mahenge in Tanzania; the Chambi locality in Tunisia, and the Gandhera Quarry in Baluchistan. These contributions vary in the amount of detail they provide. Harten-

berger et al. present a very short summary of the fauna and geology at Chambi, while Harrison et al. provide a considerably more detailed discussion of the history of collection, geology and taphonomy of the lacustrine faunas found in kimberlite pipes in Tanzania. These two localities provide an important window on the Eocene of Africa, as much of our current knowledge is derived from the Fayum biota, and additional information is welcome. The report on Gandhera Quarry is a brief preliminary report, but this locality has high diversity for an early Eocene mammalian assemblage, and it has the potential to be an important window on the diversification of modern mammal orders. The papers



reporting on Messel touch on the paleoclimate of Lake Messel and the unique preservational situation (Franzen), and the paleoecology of the fauna (Storch). Sadly, the figures in these two contributions suffer from the use of ordinary, non-glossy paper, such that the generally superb photos of the Messel specimens look dark and flat and features are difficult to see. It is unfortunate that the figures were not adjusted to compensate for the choice of paper.

The remaining chapters concern North American localities. By far the largest grouping consists of taphonomic analyses of unusual facies found in the classic sections of Utah and Wyoming. These include analyses of microvertebrate faunas found in freshwater limestones in the Willwood Formation in the Clark's Fork Basin (Bloch and Bowen), concentrations of microvertebrates in the Willwood Formation in the Bighorn Basin (Silcox and Rose), stratigraphy and taphonomy of classic localities at Grizzly Buttes in the Bridger Formation (Alexander and Burger) and the Gnat-Out-of-Hell locality in the Uinta Formation (Thornton and Rasmussen). Although these papers are diverse in their interpretations of the depositional environments involved, they generally focus on the smaller mammals, and provide a different perspective on the relative abundance of taxa at different time intervals during the early and middle Eocene. Three papers present taphonomic analyses of mass death assemblages. The most straightforward to interpret appear to be catastrophic mass death assemblages of *Meniscotherium* (Williamson), which are found in floodplain fluvial deposits. More complex depositional environments appear to have been involved in the case of the **Omomys** Quarry in the Bridger Formation (Murphey et al.), with a complex history of events in the case of Roehler's **Coryphodon** Catas-

trophe Quarry in the Wasatch Formation (McGee). Grande's paper on the Green River Formation presents a systematic overview of the teleost fauna of the Great Lakes complex, which also suffers from the photographic limitations mentioned above. He provides an interesting summary of the differences among the faunas of the three different lake faunas found in the Green River, which serves as a useful introduction for those among us who see the specimens everywhere yet know little about the deposit.

By far the most intriguing paper is Gunnell and Bartels' study of basin margin deposits in the Rocky Mountain Interior. They compared terrestrial vertebrate faunas from the margin of the Green River Basin with those found in the basin center, and have found important differences between the two environments. Faunas from the basin margin have higher species richness than those found in the basin center. Taxa that are rare in the basin center are frequently common in the basin margin faunas, and in several cases, taxa that appear to be ancestor-descendant species found in separate time intervals in the basin center appear contemporaneously, sometimes with morphological intermediates, in the basin margin faunas. The authors also suggest that these assemblages may represent a more diverse environment, one which promotes speciation. The migration of new species from the basin margin to the basin center might explain their sudden appearances in basin center faunas. It's an intriguing idea, and I look forward to further tests of the hypothesis. Clearly, these faunas have important implications for mammalian biostratigraphy in this region, and although a great deal of work has been done, much remains.

This book is an interesting collection of papers for fans of the Eocene, in spite

of the problems with some of the figures. The Gunnell and Bartels chapter deserves to be widely read, but I suspect the remaining papers will be of more interest to the specialist than a general paleontology audience.