PALAIOS, 2007, v. 22, p. 500–512
Research Article
DOI: 10.2110/palo.2005.p05-125r

Rare earth element geochemistry and taphonomy of the Early Cretaceous Crystal Geyser Dinosaur Quarry, east-central Utah

Celina A. Suarez,* Marina B. Suarez, Dennis O. Terry Jr., David E. Grandstaff

Department of Geology, Temple University, Philadelphia, Pennsylvania 19122, USA
e-mail: csuarez@ku.edu

*Corresponding Author. Current address: Department of Geology, University of Kansas, 1475 Jayhawk Blvd., Room 120, Lawrence, Kansas, 66045-7613, USA.
Keywords: *Falcarius utahensis*, Cedar Mountain Formation, vertebrate paleontology, rare earth element, bone fossilization

ABSTRACT

The Crystal Geyser Dinosaur Quarry contains a large monospecific accumulation of bones from a basal therizinosaur, *Falcarius utahensis*. The quarry is located approximately 16 km south of Green River, Utah, at the base of the early Cretaceous (Barremian) Yellow Cat Member of the Cedar Mountain Formation. Fossil bones in the quarry occur in three units that have distinct taphonomic, lithologic, and geochemical characteristics. Rare earth element compositions of fossils suggest that bones from each unit were drawn from different reservoirs or sources having distinctly different compositions, and fossils were not reworked between units. Compositions of bones differ greatly within Units 1 and 2, even within the same 1-m^2 quarry grid. These chemical differences and taphonomic characteristics, such as current orientation, hydraulic sorting, and occasional extensive abrasion, suggest that bones from these two units are allochthonous and were fossilized at other localities, possibly over an area of several kilometers, and were then eroded, transported, and concentrated in a spring-influenced fluvial environment. Bones in Unit 3 have very similar rare earth element signatures, suggesting that they were probably fossilized in situ at a separate time from bones in Units 1 and 2. At least two mass mortality events were responsible for the monospecific assemblage of bones at the quarry. Because bones may have been concentrated from a wide area, causes of mass mortality must have been regionally extensive, possibly owing to seasonal drought, sudden changes in weather, or disease.