PALAIOS, 2011, v. 26, p. 54–64
Research Article
DOI: 10.2110/palo.2010.p10-047r

New insights on the taphonomy of the exceptional mammalian fossil sites of Cerro de los Batallones (late Miocene, Spain) based on rare earth element geochemistry

M. Soledad Domingo,[1, 2]* Laura Domingo,[3, 4, 5] Israel M. Sánchez,[2] M. Teresa Alberdi,[2]

Beatriz Azanza,[6] and Jorge Morales[2]

[1]Museum of Paleontology, University of Michigan, Ann Arbor, Michigan 48109, USA; [2]Departamento de Paleobiología, Museo Nacional de Ciencias Naturales-CSIC, 28006, Madrid, Spain; [3]Earth and Planetary Sciences Department, University of California, Santa Cruz, California 95064, USA; [4]Departamento de Paleontología, Facultad CC. Geológicas, Universidad Complutense de Madrid, 28040, Madrid, Spain; [5]Unidad de Investigación de Paleontología, Instituto de Geología Económica-CSIC, 28040, Madrid, Spain; [6]Departamento de Ciencias de la Tierra, Facultad Ciencias, Universidad de Zaragoza, 50009, Zaragoza, Spain
e-mail: soledm@umich.edu
**Corresponding author.*

Keywords: Batallones-1, bone assemblage, REE, paleoenvironment, diagenesis

ABSTRACT

Cerro de los Batallones fossil sites are distinguished by large and diverse accumulations of Miocene vertebrate fauna. Little taphonomic research has been conducted on these assemblages so far, however. Results of Rare Earth Element (REE) analyses constrain diverse aspects of the taphonomic history undergone by the bones and constitute a starting point for subsequent taphonomic studies. Cerro de los Batallones localities were formed as cavities and seem to be composed of two types of assemblages that differ in their stratigraphic position, internal stratigraphic architecture, taxonomic composition and several taphonomic features. Despite these differences, chemically analyzed bones from the Batallones-1 upper and lower level assemblages exhibit undistinguishable REE patterns both within and between them. This, together with other taphonomic features, indicates that bones are autochthonous and that the depositional context remained constant during the sedimentation of the cavity filling. In addition, REE analyses are a key tool in unveiling the provenance of those fossil bones that could be regarded as allochthonous considering their peculiar macroscopic modifications. Negative Ce anomalies exhibited by isolated fossil bones lead to the proposal that the ponds that existed in the lower level of Batallones-1 were oxic. This inference clarifies the mode of accumulation of individuals in this assemblage: the carcasses did not accumulate massively over a brief period of time but rather they concentrated and, therefore, decayed over a relatively prolonged time span.