Geological stories and dinosaurs of the Iberian Basin

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Introduction

Within Spain, the fossil record of the Iberian Basin has provided the first reports of dinosaurs (see Pereda-Suberbiola and Ruiz-Omeñaca, 2005), the first described dinosaur species (Sanz et al., 1987), and some of the Mesozoic vertebrate sites with the greatest paleobiodiversity (e.g., Buscalioni et al., 2008; Canudo et al., 2010).

Mesozoic sedimentation in the Iberian Basin took place within an intraplate extensional tectonic framework related to Tethys and Central Atlantic spreading (Salas and Casas, 1993). Two main rift stages (Late Permian to Hettangian and Late Jurassic to Early Cretaceous) followed by their subsequent postrift phases have been recognized (Salas et al., 2001). Later on, the latest Cretaceous onset of Africa-Europe-Iberia convergence had impact in the interior areas of northeast Iberia, with the progressive inversion and contractive deformation of the Mesozoic Iberian basin rift system giving rise to the alpine Iberian Ranges (e.g., Álvaro et al., 1979).

Aspects such as tectonics, climate, and sea level changes have influenced the evolution of the sedimentary record and paleogeography of the Iberian Basin. They also influence the dinosaur fossil record. The latter is also affected by the evolutionary history and paleobiogeography of Dinosauria. All of this leads us to find in the Iberian Basin geological units and periods that are especially interesting for dinosaur paleontology. Likewise, the study of the dinosaur record of the Iberian Basin and the need to contextualize findings and faunal associations have contributed to the advancement of our knowledge of geological history, with notable cases, such as those reviewed in this contribution.

Concluding remarks

There have been cases in which the study of dinosaurs and fossil assemblages in the Iberian Basin have contributed to improving our understanding of regional geology. There are even dinosaurs that have changed history (geologically):

The scientific discussion about the age and geological context of the dinosaur *Aragosaurus* (e.g. Royo-Torres et al., 2009; Aurell et al., 2016) has led to a redefinition of the geological history of an entire sub-basin on the western margin of the Maestrazgo Basin (Teruel province). This has implications for the reconstruction of the paleobiodiversity of Late Jurassic-Early Cretaceous fossil assemblages and the regional tecto-sedimentary evolution, including the definition of new lithostratigraphic units.

The integrated study of the stratigraphic, paleoenvironmental context and vertebrate record (bones, ichnites, eggshells) of some Early Cretaceous units of Maestrazgo (Aurell et al., 2016; Gasca et al., 2017) and Cameros (Aurell et al., 2021;

Pinilla-Serrano and Gasca, 2025) has allowed us to characterize the influence of synsedimentary tectonics on the basin fill and facies distribution. It also shows how these, in turn, determine the presence of vertebrate fossils and their type of preservation.

The stratigraphic, sedimentological and paleontological characterization of the successions recorded during the initial stages of development of the Montalbán subbasin (Teruel province) has had major implication to understand the latest Cretaceous palaeogeographic evolution of northeast Iberia (Aurell et al., 2022). Sedimentation during the Campanian-Maastrichtian was irregularly distributed in the interior areas of the Iberian basin, with a patchy distribution of the subsiding continental-dominated areas. In all the latest Cretaceous continental subbasins of the Iberian basin, dinosaur fossil sites including abundant titanosaurs and ornithopods are concentrated in a relatively narrow timespan from late Campanian to earliest Maastrichtian.

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