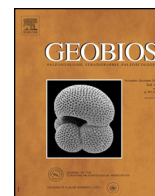




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Original article

Brachiopod faunal exchange through an epioceanic-epicontinental transitional area from the Early Jurassic South Iberian platform system[☆]



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ABSTRACT

The La Mola region (eastern External Betic Zone) can be regarded as one of the easternmost complete Jurassic successions of the Betic Cordillera in the Iberian Peninsula, but the paleogeographical setting of their outcrops remains widely discussed. Analysis of brachiopod assemblages from the Lower Jurassic improves the accuracy of previous paleogeographical data, enabling identification of a mainly epioceanic transitional area in which influences of epicontinental habitats are also detected. Assemblage 1, mainly with a Mediterranean affinity but also sharing several constituents with the African and Northeastern Iberian basins, typifies the Sinemurian–Pliensbachian transition. Assemblage 2, as a whole, shows a transitional character between epioceanic and epicontinental habitats; it is subdivided into two successive and interrelated sub-assemblages: Ass. 2a (Damonense–Tenuicostatum Zones) reveals a free connection with the epioceanic Subbetic area, whereas Ass. 2b (Uppermost Pliensbachian–Lower Toarcian) shows a closer relationship with epicontinental environments. Assemblage 3 (Uppermost Spinatum–basal Serpentinum Zones) is commonly recorded in the peri-Iberian epicontinental platform system integrated within the NW-European bioprovince, but it can also be regarded as a marginal assemblage that is widespread in the westernmost Tethyan margin prior to the Early Toarcian extinction event. Assemblage 2 constitutes a suitable index for assessing the paleobiogeographical affinity of the La Mola region, as Ass. 2a is progressively replaced by Ass. 2b, thus triggering the arrival of epicontinental taxa to the more intra-epioceanic Subbetic environments, inferring a possible connection through the La Mola transitional slope. Consequently, this region enabled a faunal mixing and exchange between both environments, and La Mola likely remained as an area that would facilitate migration and an effective dispersal seaway or, at least, did not constitute an ecological filter-barrier for brachiopods. Biostratigraphical data from brachiopods and ammonites are correlated for the first time in La Mola, refining and calibrating biochronostratigraphical gaps in the pre-Domerian deposits where biochronological markers are usually scarce, and around the Pliensbachian–Toarcian boundary, a crucial timespan in which the Early Toarcian extinction event took place.

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1. Introduction

Distribution of benthic organisms with a short planktonic larval stage, such as brachiopods, is widely used as a suitable tool for the establishment of Mesozoic paleobiogeographical biochoremas (Ager, 1967; Vörös, 1984, 1993, 2005; Manceñido, 2002; Baeza-Carratalá et al., 2014). In the Early Jurassic, the brachiopod

provinciality of the Western Tethys Ocean was clearly established in two major biochoremas: the NW-European and Mediterranean paleobioprovinces (Ager, 1967, 1971, 1973; Vörös, 1984, 1986, 1993; Manceñido, 2002). This paleobiogeographical distribution has been interpreted by several authors in terms of epioceanic and epicontinental habitats, respectively (cf. Hallam, 1971; Vörös, 1986, 2005; Ager, 1993; Colás and García Joral, 2012; Baeza-Carratalá et al., 2011a, 2014; Baeza-Carratalá and Sepehriannasab, 2014), where environmental factors, such as depth, terrigenous input or nutrient availability, among others, played a decisive role in brachiopod settlement. Consequently, epioceanic-epicontinental transitional areas providing evidence of brachiopod migration

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or faunal exchanges are worth studying in order to throw light upon the development of effective dispersal seaways or, conversely, faunal filter-barriers. In the Betic Cordillera, one of these changeover zones could have developed around the La Mola region (Alicante, Spain), located on the easternmost transitional slope between the Intermediate Domain (between the Prebetic-Subbetic zones) and the Subbetic area (Nieto et al., 1994, 2014; Nieto, 1997).

The present paper attempts to detect possible connections through a transitional area between the epicontinental Subbetic basins and the epicontinental platform system established during the Early Jurassic in the south Iberian margin by means of taxonomic and paleobiogeographical analyses performed on the brachiopod assemblages from the La Mola region. The paleogeographical setting of the La Mola region during the Jurassic has been widely discussed in earlier studies. Some authors have ascribed this region to the Subbetic domain (Fallot, 1945; Iñesta et al., 1990; Iñesta, 1993), whereas others described it as part of the Intermediate Domain, between the Prebetic and Subbetic areas (Azéma, 1977; Nieto et al., 1994; Nieto, 1997). Our research puts forward a comparative analysis of the brachiopod assemblages from La Mola, thus enhancing the knowledge provided by previous studies (Jiménez de Cisneros, 1920, 1927; Iñesta, 1993). These assemblages are compared with the well-documented faunas from neighboring basins, such as the Eastern Subbetic (Baeza-Carratalá, 2011, 2013; Baeza-Carratalá and García Joral, 2012), the Iberian Range (García Joral and Goy, 2000; García Joral et al., 2011), the Internal Betic Zones (Baeza-Carratalá et al., 2011a), and the Lusitanian Basin (Comas-Rengifo et al., 2013, 2015). As a result, these analyses provide new data on this transitional region, which can be regarded as the easternmost complete Jurassic succession of the Betic Cordillera in the Iberian Peninsula, as well as the outcrops closest to the epicontinental habitats with brachiopod records, in the absence of the exposure of the Prebetic ones.

Finally, previous ammonite records are combined with the new data provided herein by brachiopod assemblages from the La Mola section and correlated with biochronologically well-documented ones from adjacent basins such as the Subbetic area, Internal Betic zones, Lusitanian basin and Iberian Range. This enabled us to calibrate chronostratigraphical and depositional hiatuses previously identified in this area, contributing to a better understanding of the regional lowermost Jurassic facies where biostratigraphical markers are very scarce (Vera, 1998), as well as the Pliensbachian–Toarcian transition interval in this region, a crucial timespan in which the Early Toarcian extinction event took place in the Tethys Ocean as a whole.

2. Geographical and geological setting

La Mola Hill is an isolated Jurassic outcrop surrounded by Triassic deposits in Keuper facies located in the Western part of the province of Alicante (Fig. 1). It is located to the North of the city of Novelda and can be considered as an intermediate area between the Southern Iberian Range outcrops (Albacete and Valencia), the Balearic Isles, and the Eastern Betic Cordillera. This outcrop presents the easternmost complete Jurassic succession of the Betic Cordillera in the Iberian Peninsula, as there are no outcrops in eastern Alicante or southern Valencia revealing well-developed Betic Jurassic successions. Indeed, only the western Balearic Isles, as the prolongation of the Cordillera, present any appropriate Jurassic sequences (Vera et al., 2004).

Jurassic outcrops in La Mola Hill are embedded within a NNW–SSE diapiric lineation (a salt wall known as the Vinalopó Valley diapir) of Triassic Keuper facies (shales, gypsum, and sandstones). This diapiric lineation separates the Prebetic of the Alicante Domain (De Ruig, 1992) to the East, and the Prebetic s.s. and the Subbetic ones to the West (García-Hernández et al., 1980) (Fig. 1). The first

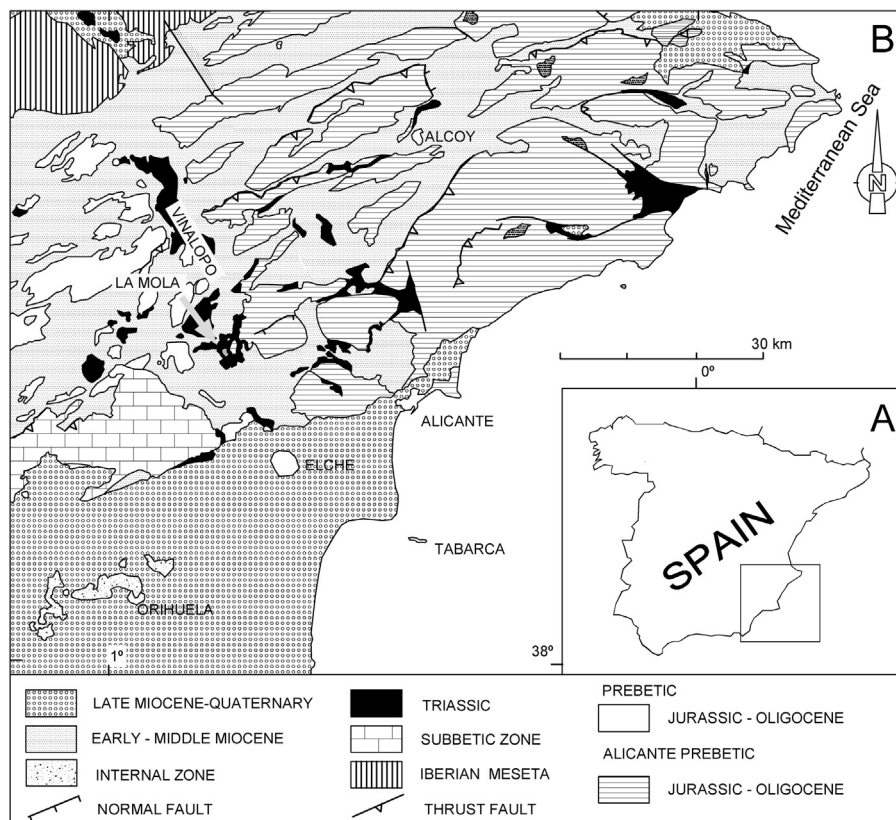


Fig. 1. A. Geographical situation of the study area in Southeastern Spain. B. Situation of the La Mola outcrop within the context of the Eastern Betic Cordillera in the Alicante Province.

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