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Sedimentological evidence of an assumed ancient anchorage in the hinterland of a Phoenician settlement (Guadiana estuary/SW-Spain)



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ABSTRACT

As bays, lagoons and estuaries ensure protection from wind, and a hinterland rich in natural resources is most enticing, during the early Iron Age the seafaring Phoenician settlers chose such locations all over the Mediterranean for their seaports, establishing pan-Mediterranean trade from the late 9th century BCE onwards. Despite the difficult nautical conditions, Phoenician sailors had conquered the Strait of Gibraltar by the end of the 9th century BCE. Today, many of these sites along the Mediterranean and Atlantic coasts are located several kilometers inland, due to coastal progradation.

This paper investigates whether the wetlands of the Estero de la Nao, a tidal channel and small tributary within the lower Guadiana estuary (Gulf of Cádiz, SW Iberia), were able to serve as a potential natural harbor location and port of trade for the seafaring Phoenician population. The focus of this study is set on a systematic analysis of sedimentological data.

The lithostratigraphy of three sediment cores shows that at least 8000 years ago open water conditions existed within a marine embayment characterized by sedimentation under estuarine conditions. This situation prevailed for several millennia. From the Early Bronze Age, silting-up processes of the former navigable areas occurred. Additionally, a distinct stratigraphic gap within the sedimentary sequence of one particular sediment core provides strong evidence of ancient dredging activities that attempted to cope with the local siltation processes. In the most recent strata, badly sorted sediments intercalated with brick- and shell fragments provide evidence of a high energy event probably triggered by the great Lisbon earthquake in 1755.

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1. Introduction

Previous studies show that the Phoenician settlers preferred specific locations for establishing their settlements and harbors. In Levantine Sidon and Tyre, important cities in the Phoenician homeland, islands or coastal promontories guaranteed protection from climatic agents (Marriner et al., 2005; Marriner and Morhange, 2006; Marriner et al., 2006). Phoenician settlements in the western Mediterranean along the coast of the Gulf of Cádiz, e.g. the Phoenician foundation ‘Gadir’ (modern day Cádiz), show characteristics very similar to those of the homeland (Arteaga and Roos, 2002). In general, the most important Phoenician settlements are located close to estuaries and the alluvial plains of major rivers (Fig. 1A and B) (Aubert, 2001).

The recent discovery of a Phoenician settlement and necropolis, the evaluation of locational factors and the knowledge of Phoenician site selection and acquisition processes raise the research question, to what extent the natural prerequisites for the establishment and usage of a back-barrier anchorage at the coastal site of Andalusian border town of Ayamonte were given throughout former times. Especially for the Phoenician time, it is known that the utilization of at least two anchorage locations, which were adapted to the site's physiographic prerequisites, was a common practice. The previously observed method, using a second additional sheltered back-barrier harbor location (e. g. Nora, Tharros, Sulcis; all on Sardinia) (Moscati, 2001), is neither known from historic sources nor from other archives for the presented site in Ayamonte. Wachsmann et al. (2009) studied the Iron Age Site of Castro Marim, which is located only 3.5 km west of the presented study site. The authors reconstructed the amount, nature, and general timing of geomorphological changes at the site and determined that the topographic criteria offered good shelter and

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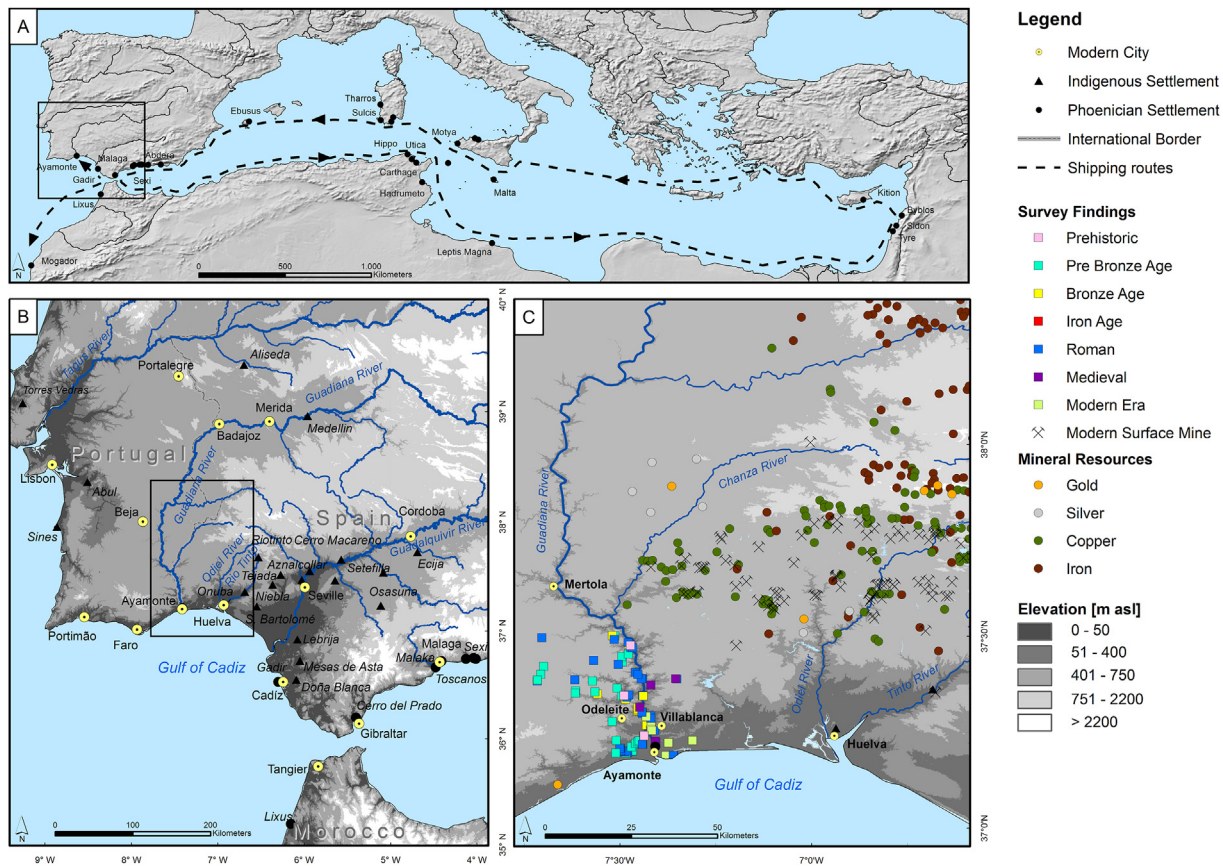


Fig. 1. Supraregional distribution of Phoenician settlements in the Mediterranean – (A) – Phoenician settlements and trading routes of the Mediterranean; (B) – Phoenician and indigenous settlements of southwest Iberia; (C) – Locations of archaeological survey findings.

moorings, but decelerated sea-level rise and subsequent filling of the marine embayments took place c. 6500–5000 BP.

Coastal environments along the Spanish and Portuguese coast have undergone significant changes during the last 10,000 years. Various studies document that after deglaciation the relative sea level at the southwestern Iberian coast reached its present position ca. 4500–3000 calBCE (Goy et al., 1996; Dabrio et al., 2000; Dias et al., 2000; Boski et al., 2002). The highly dynamic coastal system with natural processes of marine transgression, progradation and aggradation acts as a highly sensitive interface of human–environment relations. Coherent to these regional coastal changes, Mediterranean settlers of the time were challenged by local developments (e.g. massive siltation at river mouths) which often brought deterioration of former favorable conditions and which required laborious management in terms of dredging or alteration of harbors (Marriner et al., 2005; Marriner and Morhange, 2006; Marriner et al., 2006; Kraft et al., 2007; Goiran et al., 2014; Marriner et al., 2014).

Sediment records of coastal lagoons, estuaries, and tidal marshes have been extensively studied and proven to be valuable geoarchives for paleoenvironmental reconstructions. Low rates of bioturbation combined with high sedimentation rates provide ideal conditions for detecting long- and short-term changes of sedimentation processes within coastal environments (Chagué-Goff et al., 2000). Sediment cores from estuaries and tidal marshes located along the Gulf of Cádiz have therefore been used to study relative sea-level fluctuations (Goy et al., 1996; Dabrio et al., 2000; Boski et al., 2008), to investigate sediment dynamics (Borrego et al., 1993), to demonstrate the occurrence of earthquakes and tsunamis

(Morales et al., 2008; Reicherter et al., 2010; Rodríguez-Vidal et al., 2011; Rodríguez-Ramírez et al., 2015) and to reconstruct environmental changes and their geoarchaeological implications (Freitas et al., 2002; Wachsmann et al., 2009).

The research presented here was conducted within the framework of an archaeological excavation supported by the Andalusian heritage agency (Junta de Andalucía) and carried out by the German Archaeological Institute (DAI) under the leadership of D. Marzoli and E. García Teyssandier (Teyssandier and Marzoli, 2014). The goal of the investigation is to reconstruct the late Holocene palaeogeographical evolution of a salt marsh environment located close to the excavated Phoenician settlement and necropolis, which are situated on the coastal ridge of Ayamonte (Province of Huelva). The goal of the investigation is to reconstruct the late Holocene palaeogeographical evolution of a salt-marsh environment located close to the excavated Phoenician settlement of Ayamonte (Province of Huelva). The aim is to assess the site's locational characteristics and to determine the timing and dynamics of silting-up processes. On this basis the location is evaluated in terms of the prerequisites for a natural anchorage in prehistoric periods.

2. Regional setting

2.1. Landscape characteristics

The study site is located within the lower Guadiana basin, in the Spanish province of Huelva immediately adjacent to the Portuguese border. The area under study comprises the small tributary named Estero de la Nao, which discharges into the lower Guadiana estuary,

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