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The gold of the Carambolo Treasure: New data on its origin by elemental (LA-ICP-MS) and lead isotope (MC-ICP-MS) analysis

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ABSTRACT

The Carambolo Treasure (Seville, Spain), is a key collection of materials from the 1st Millennium BC Mediterranean. Besides the uniqueness, technical complexity and beauty of this assemblage of gold associated with the mythical name of Tartessos, the treasure has been at the epicentre of debates over the last 50 years regarding the Phoenician presence in the west and the origin of the first great western civilization. However, the absence of a precise archaeological context and systematic analyses aimed at identifying the source of the supply of gold have led to diverse and conflicting interpretations in terms of its functionality (ritual from a Phoenician temple versus ostentation of a palatial royalty), and origin (Atlantic *vs* Eastern Mediterranean).

New chemical (by LA-ICP-MS) and isotopic data (Pb by MC-ICP-MS) are presented in this work, which provide an alternative interpretation. The results suggest that the origins of the gold may not be thousands of kilometres away, in the Atlantic or the Mediterranean, but rather in the same region. We highlight geochemical similarities with the gold of the preceding 3rd Millennium BC civilization, with its main political and economic hub at Valencina de la Concepción, located just 2000 m from the Carambolo itself.

1. Introduction

Gold has fascinated people in most cultures since early times. After the emergence of the first political systems, its principal functions have been the production of goods oriented to the expression-reproduction of power and social inequality and a store of wealth. Such is the case of the most important goldsmithing collection in the Protohistory of the Iberian Peninsula, highlighted at the exhibition *Assyria to Iberia at the Dawn of the Classical Age*, held in the Metropolitan Museum of Art of New York in 2014, now kept in the Archaeological Museum of Seville (Spain): The Carambolo Treasure (Fig. 1).

Its accidental discovery inside a vase, in 1958 (Carriazo, 1958, 1959), was an extremely important event in the world of Spanish archaeology: the twenty-one gold jewels weighing 2.770 kg and showing goldsmithing techniques such as filigree, soldering, granulation, enamelling in blue and probably in white (Navarro and San Martín, 2017) were presented as the first material evidence of the mythical kingdom of Tartessos, recorded in classical sources (e.g. Herodotus, Hecateo, Avianus), whose site numerous researchers, such as A. Schulten (1923, 1924), had attempted to find since the end of the 19th and early 20th centuries (Torres, 2002; Escacena, 2010).

This circumstance, alongside the enormous acceptance of diffusionist ideas (Trigger, 1989) in Spanish archaeology and the scarcity of efficient systematic analyses aimed at precisely identifying the source of the gold, fuelled profuse and controversial debates regarding the functionality and origin of this treasure, although at all times under the same paradigm: the Phoenician presence in the West.

A first interpretation purported that the jewels came from the crown and ornaments from Arganthonios, the mythical long-lived

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Fig. 1. The Carambolo treasure (Copyright: Regional council of culture. Granted by the museum of Seville. Author: J. Morón).

king of Tartessos (Carriazo, 1958, 1959, 1973). Nevertheless, at the turn of the 21st century, the documentation of new gold products in the Carambolo linked to a unique monumental building interpreted as a sanctuary and dated between 2770 ± 50 BP and 2502 ± 40 BP (Fernández and Rodríguez, 2005a,b, 2010), led to an approximation of the chronology of the Treasure (towards the end of the 8th century – early 7th century BC), the possible date of when it was hidden (end of the 7th – early 6th century BC) and this led to articulating alternative functional proposals, such as the ritual dowry of a priest besides an ox and cow for sacrifice in the liturgical commemorations dedicated to the Phoenician gods, Baal and Astarte (Amores and Escacena, 2003; Belén, 2011; De la Bandera et al., 2010; Fernández and Rodríguez, 2010).

In the geochemical field, Kalb and Hartmann (1969) obtained the first elemental results on a sample of the treasure through optical emission spectroscopy and SEM, setting its origin in the East Mediterranean (Gold Type U), due to the presence of a copper alloy technology and alluvial traces of platinum.

The latter element (Pt), along with the presence of copper in the alloy, were determining factors in their traditional interpretation, since they were considered as indicators/tracers of a technological change and a supply of external provenance (Atlantic and/or Eastern Mediterranean), which would determine a chronological threshold (8^{th}-7th century BC) for gold metallurgy on the Iberian Peninsula for which the treasure would be one of its first representatives (Hartmann, 1970, 1982; Kalb and Hartmann, 1969).

This perspective remained almost unaltered since subsequent elemental analyses, despite having increased knowledge of joining techniques in the construction of jewels and other interesting data, have been unable to move forward in evaluating its provenance due to the analytical resolution (detection of major elements: Ag/Au/Cu) of the applied (XRF and PIXE) methodology (Hartmann, 1982; Ontalba et al., 2002; Scrivano et al., 2013; etc.).

The stylistic and typological studies, without entering the debate over the origin of the raw material and after noting the lack of parallels for the jewels in the Mediterranean goldwork of the 1st Millennium BC, would point to an interpretation focused on its origin. The Carambolo Treasure would be the expression of the dawn, at the turn of the 7th century BC, of a new local technological tradition (Tartessian Culture) resulting from the convergence of Atlantic goldsmithing at the end of the Bronze Age with the Egyptian-Mesopotamian tradition of the Eastern Mediterranean; this influx would arrive with the Phoenician colonization, and even at an earlier date (Perea and Armbruster, 1998, 2007; Guerra and Rehren, 2009).

Against this background, we consider that an alternative proposal could be put forward to explain the origin of the Carambolo Treasure, based on a new scientific research programme designed to compare the provenance of the gold and its manufacture based on an analysis of its elemental and isotopic composition, using a combination of the two advanced techniques: laser ablation (by LA-ICP-MS) and lead isotopes (by MC-ICP-MS and LA-MC-ICP-MS). Additionally, we perform a comparative study of the results in space and time, regarding the new records of gold producing recovered in the course of the most recent archaeological interventions in the Carambolo (see above), contemporary and subsequent productions (8^{th}-4th centuries BC) and the gold productions that preceded it almost 2000 years earlier (3rd Millennium BC) in the same geographical area: the Lower Guadalquivir Basin (Fig. 2).

This work presents new chemical and isotopic data which enable an alternative interpretation as to the origin of the Carambolo Treasure. The results suggest a direct link with the gold metallurgy from the 3rd Millennium BC civilization in the Lower Guadalquivir Basin and with its main economic and political hub: Valencina de la Concepción. This settlement spread alongside the Carambolo hill and acted as a gateway for raw materials of regional and transcontinental origin (i.e. copper, gold, ivory, amber, limestone), and a space for their artisanal transformation into products (Nocete, 2001, 2014; Nocete and Nocete, 2015; Nocete et al., 2005, 2008, 2013), including gold metallurgy (Nocete et al., 2014).

2. Materials and method

The Carambolo Treasure comprises twenty-one pieces of jewellery. A necklace -DO5489 - from which hang seven seals; two cylindrical bracelets in a circular section -DO5487 and DO5488; three rectangular shaped plates, among which two formal and decorative sets can be distinguished: eight of them with aligned motifs of semi-spherical bodies with a central umbro alternating with two types of tensioning elements -DO5490-5491-5492-5493-5498-5499-5500-5501- and a further eight with alignments of