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Iron Age ovens and hearths from the hilltop of Quinta de Crestelos, Sabor Valley (NE Portugal): An archaeobotanical approach on typology, functionality and firewood use

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ABSTRACT

The construction of Baixo Sabor Dam (NE Portugal), led to the discovery and excavation of the site of Quinta de Crestelos, with a human occupation ranging from the Early Palaeolithic to mid-20th century. Its Iron Age phase, found at the site's hilltop, revealed an unprecedented large number of combustion structures, comprehending several typologies of ovens and hearths, as well as refuse deposits in which archaeobotanical samples were recovered.

Given the number and interpretative importance of these structures to the general understanding of the site, a holistic approach to their study was devised. This research combines the analysis of archaeobotanical samples with the morphological study of archaeological features comprising typological analysis. Such corpus of data is finally compared with ethnographical examples. The objectives of this study were to identify the main firewood species used inside the ovens, to define patterns of fuel use, to evaluate the existence of firewood selection - including both taxonomic outcomes and dendrological attributes - and their possible determining factors, as well as these structures functional purposes and patterns of use.

The analysis of the carbonized plant content in these combustion structures displayed a diverse range of 15 taxa, with the majority of the ovens and hearths revealing predominance of *Arbutus unedo*, *Cistus* sp., *Fraxinus* sp., *Juniperus* sp. or *Quercus* evergreen. *Triticum aestivum/durum* is the main crop recovered in the studied samples, followed by *Panicum miliaceum*. Residual presences of *Hordeum vulgare*, *Vicia faba*, *Vitis vinifera* and *Papaver* sp. were recovered as well.

The archaeobotanical results, together with the typology of the ovens and hearths, their spatial distribution and ethnographical examples, allowed the discussion of the structure's functionality, the identification of patterns and trends of their use according to different typologies and contexts and the recognition of possible firewood selection and storage practices. This study also provides a preliminary approach to the paleolandscape of the site during the Iron Age of NW Iberia.

1. Introduction

The domestication of fire was one of the most revolutionary episodes in human evolution (Berna et al., 2012), changing almost all aspects of human life (Wrangham and Carmody, 2010). Since then, the contingencies and specificities of fire management by past

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populations have resulted in the emergence of several types of structures where fire was managed (Olive and Taborin, 1987). These contexts range from simple accumulation of stones to highly complex structures combining several materials and construction techniques (Pons et al., 1994; Roux and Raux, 1996; Olive, 1997; Gascó, 2002; among others). Whatever their shapes and sizes, contexts where fire was handled were fundamental to the everyday life of human communities. They were not only structures for cooking, lighting or heating but also the center of social, economic and ritual activities in which took part individuals, families and communities.

It comes then as no surprise that combustion structures such as hearths and ovens are among the most ubiquitous and important occupation structures found in archaeological sites. In addition, these types of structures can provide invaluable information for the characterization of those past populations.

In the Iberian Peninsula, several kinds of combustion structures have been identified in Iron Age sites. Their analysis is usually focussed on their description and functionality in association with the type of settlement (*vide infra*). Among these structures, hearths are the most common. Still, these can have multiple forms and serve multiple purposes making it difficult to approach them systematically from typological and functional perspectives. On the other hand, ovens found in Iberian Iron Age sites display specific typologies and characteristics associated with three main purposes: pottery and metallurgical furnaces and food ovens.

Metallurgical furnaces are among the most studied type of ovens, with several dozens of examples existent particularly in the NW and N of Iberia (e.g. Gómez Ramos, 1996; Fanjul Peraza and Marón Suárez, 2006). These ovens or furnaces were constructed partially underground making use of slopes and natural topographical depressions as their preferential build sites in order to maintain the high temperatures necessary to fuse lime and metal alloys (Gómez Ramos, 1996). Sizes also varied greatly in respect to typology, as can be perceived by the metallurgical area identified in Santa Olaia (Pereira, 2010). In this case, a group of five small ovens (averaging 70 × 50 cm) with their base (and possible dome) made of clay where identified alongside 2 m wide furnaces.

Pottery furnaces also come in varied types and sizes, despite fewer examples have been identified in the Iberian area. A medium-large size (ranging from 2 m to 5 m long) type of pottery oven has been found mostly in the south of the peninsula and associated with eastern Mediterranean (Phoenician) influences and their use persisted from the Bronze and Iron age, until the Roman Period (Roumens, 1975; Fernández and Vargas, 2012; Ávila et al., 2013). These ovens, built using small stones and clay, consisted in a *praefurnium* and a larger chamber build with adobe and clay. In its center, a small pillar was raised in order to sustain the grid in which the pottery would be placed. A different typology was identified in the Vaccean settlement of Pintia in the Spanish Meseta (Escudero Navarro and Sanz Mínguez, 1993). This example consists of an 8 × 5 m grid made of clay with small perforations. Firewood was placed beneath this structure. Evidences of cooking of pottery in portable ceramic ovens were also identified in several sites of NW Iberia (Rey Castiñeira et al., 2013). This flexible solution allowed for much simpler cooking process, despite their limiter size, with almost no perceptibility in the archaeological record.

In fact, very few ovens associated with the cooking of food or the baking of bread have been identified in Iron Age contexts in Iberia. Several bread ovens have been identified in central Spain, associated with domestic habitats (García Huerta et al., 2006). These structures present a circular shape (between 2,40 m and 3,40 m in diameter) and were made of stone. Only the base or sections of the ovens were preserved. The bread/food oven found in a Late Roman sector of Monte Mozinho (Penafiel, Portugal) followed the exact same typology (Vaz et al., 2015). Also associated with domestic contexts, ascribed to the 7th or 6th century BC, a different type of bread/food oven was identified in the site of Soto del Medinilla, Valladolid, Spain. This circular oven (1,15 m in diameter) is made of adobe and clay. Differential thermal analysis revealed that the structure withstood temperatures of no more than 400°, a temperature range inconsistent with its use as metallurgical or pottery furnace. The oven was thus interpreted as being used to prepare food (Misiego Tejeda et al., 1993). The use of decorated portable pottery domes as food ovens were also identified in Santo Estevão da Facha (Montalegre, Portugal) (Martín-Seijo, 2013).

The apparent scarcity of baking/food ovens during this period is most likely associated with difficulties in their interpretation or because of the preferential use of other solutions, making use of perishable materials with few archaeological impact.

Combustion structures such as referred above have been one of the most recurrent type of archaeological contexts studied by archaeobotanical analysis (Buxó, 1990; Chabal et al., 1999; Pearsall, 2000) because of the evident presence of carbonized remains and thus the close thematic proximity between these structures and the main focus of archaeobotany – the study of the relationship between people and plants in the past (Marston et al., 2014). In fact, considering that these structures are commonly interpreted as primary contexts (Fuller et al., 2014), their archaeobotanical potential is more focussed in the understanding of short-term combustion events (Figueiral, 1994; Chabal et al., 1999) thus more prone to fundamental paleoetnobotanical discussions (Pearsall, 2000). This kind of approach can provide invaluable information mainly associated with the firewood use in relation to selection, storage, preservation state, among others (e.g. Piqué, 1999, 2006; Marguerie and Hunot, 2007; Vaz et al., 2015), in contrast to a more paleo environmental characterization provided by refuse contexts (e.g. Figueiral, 1994; Asouti and Austin, 2005; Chabal et al., 1999).

In this context, ethnographical examples can provide valuable information on how diverse these structures can be, as well as providing data on their functionality and practices (Heizer, 1963; Peña-Chocarro et al., 2000; Meyer, 2003; Zapata et al., 2003; Picornell, 2011; Picornell et al., 2011). However, given the variety of human societies and differences of wood resources, cultural backgrounds and contexts, these cases should be regarded carefully, as they allow for possible contradictory and problematic results, especially when used to compare modern with past communities, even if with parallelized situations.

Focussing on the archaeobotanical analysis of soil samples recovered from the late Iron Age combustions structures of the site of Quinta de Crestelos topics such as firewood selection, oven and hearths functionality, structure typologies and landscape dynamics will be addressed in the current paper. Unlike other sites where such structures were found in direct association with domestic habitats, the majority of the large number of combustion structures found in Quinta de Crestelos was identified in a large ditch. The interpretation of this functional area proved to be a fundamental aspect in the understanding of the occupation dynamics of this Iron Age community.

2. The site of Quinta de Crestelos

In the scope of the construction of Baixo Sabor Dam (AHBS – Aproveitamento Hidroeléctrico do Baixo Sabor – EDP, Odebrecht/Bento Pedroso Construções S.A. and LENA Construções) in lower Sabor river valley, Northeast Portugal, an ambitious heritage protection plan (PSP – *Plano de Salvaguarda Patrimonial*) was created in order to safeguard archaeological, ethnographical and other cultural heritage in the affected area. The implementation of this plan led to the discovery of more than 200 archaeological sites among

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