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Buried structures in Barcelona plain's neolithic settlements: A general revision, morphological and morphometric analysis gaining a functional interpretation

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ABSTRACT

Recent excavations at Barcelona's Raval quarter have revealed a set of Early Neolithic features which suggest the presence of a permanent settlement from the Vth millennium BC onwards. Negative structures in three of the most extensively excavated sites in the quarter have been analyzed through a morphological and morphometric approach in order to discern their possible use. The study has succeeded in detecting specific shapes for specific uses, thus providing a tool which will help the interpretation of these types of features. Moreover, the first diachronic and synchronic analysis seems to indicate the existence of spatial and chronological variations. Differences in the shape of the combustion structures might provide a first step towards understanding the settlement structure in the Barcelona Plain.

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1. Introduction

The archaeological record and the knowledge about domestic structures in recent Prehistory have been radically changed by the recent approval of the heritage laws ruling contract archaeology. One of the periods in which this transformation has been strongest is the impressed ware Early Neolithic horizon. In fact, the scarcity of open air sites led Tarradell (1962), Courtin (1974) and Guilaine (1976), amongst others, to assume, no more than 25 years ago, that the settlement pattern was mainly based in shelters and caves (Bernabeu et al., 1989; Guilabert et al., 1999; García, 2003). Nevertheless, today it is clear that after the effects the 8.2 kyr event had on the Mesolithic populations (Berger and Guilaine, 2009) the landscape was later transformed by the appearance of open air hamlets in the plain (Bernabeu et al., 2016; Bosch, 1992) which were built with perishable materials, earth and stone (Papaconstantinou, 2015).

Recent research in Italy, southern France and the Iberian peninsula Mediterranean seashore have conclusively shown the existence of settlements that, without doubt, could be named as households with a high degree of sedentism starting from the earliest Neolithic stages (Bernabeu et al., 2017). Although it is true that a definitive systematization does not exist yet, several tendencies have been detected. One example would be settlements close to lakes, well documented in La Draga (Girona). This site would have had slightly raised wood rectangular huts in its earliest phases and would partially shift over dryer areas with hearths, pits and small huts interpreted as granaries (Bosch et al., 2011) in later chronologies. Features from this second period are the best documented in the majority of Early Neolithic settlements. Another of the main types of open air sites can be exemplified by Mas d'Is (Alicante), where although domestic structures have been documented, a set of significantly sized ditches which could have had a collective function, ritualistic in nature, were found (Bernabeu et al., 2003).

Evidence from settlements which essentially presents structures that have been associated with habitat functionalities and with domestic labor seem to be more common. Without exhaustiveness, some examples are the sites of Courthezon (Sénépart,

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2009) and Peiro Signado (Brioso and Manen, 2009), in the Cardial ancient Neolithic horizon, or the Epicardial site at Lalo-Espéluche (Beeching, 2009) in the French Midi area. In the Iberian Peninsula's northeast, similar sites such as Pla del Gardelo (Piera, 2010), Barranc d'en Fabra (Bosch et al., 1992), Guixerres de Vilobí (Mestres, 1982; Mestres and Esteve, 2015; Oms, 2014) and El Cavet (Oms and Morales, 2008) share significant pieces of structural evidence (postholes, hearths, etc.), which would mark the existence of circular, oval, and sometimes apsidal shaped huts. Nevertheless, wide spaces with abundant domestic or transformation structures outside huts are also abundant. In consequence, it might still be too early to attempt a complete characterization of the settlement structure for the first agricultural hamlets linked to the Neolithisation process at the Western Mediterranean. Nonetheless, the study of archaeological documentation from recent excavations will help its characterization and improve the interpretations, thus opening new debates that concern old issues.

It is also true that well preserved settlements are scarce and, often, the only recovered structures are the negative ones (García-Martínez de Lagrán, 2017). This is a widespread phenomenon in the Western Mediterranean, where bad preservation of organic materials would clearly have affected Early Neolithic buildings, which would have been precarious and built with perishable materials with a low investment of labor. Therefore, only postholes, pits and hearths tend to survive. These are the features (or parts of them) which were built below the occupation levels and were preserved thanks to their refilling with waste. This type of archaeological evidence is becoming widely detected and, therefore, new studies are being developed with more precision and exhaustiveness (Prats, 2013). French archaeology pioneered the study of combustion structures with a methodological approach that prioritized the recording of its morphologies and fillings, which allowed functional interpretations to be performed. Nevertheless, in other Mediterranean regions, the analysis of the increasing number of excavated negative structures has indirectly helped the development of various analytical approaches ranging from simple basic descriptions to other more complex chemical analyses (Sánchez et al., 1998).

This situation is especially relevant in the North-eastern Mediterranean coast of the Iberian Peninsula. This is why the analysis performed in the Barcelona plain aims to both summarize an important set of data about structures and habitat remains which were only recently recovered, and also test for possible correlations between the structure's morphometry through a set of quantitative variables (dimensions, wall morphology, etc.). Therefore the objectives of this approach are to study the possible functions these structures had and to detect their possible spatial and temporal variations.

2. Regional setting

In the process of Neolithisation in the Western Mediterranean coast, negative structures play a major role in informing the archaeologist about the architecture and the set of functional contexts present in the site. Given that ^{14}C data is only available in a handful of contexts, in order to date such structures, ceramic typology is usually the only source of direct chronological information. Major features from the ceramic assemblages produced by the first agricultural communities have been traditionally used to detect the different stages in the adoption of the economy of production and the Neolithisation process. In this regard, the ceramic production's technical and stylistic variability has been crucial for defining a periodization based on three horizons: Cardial, Epicardial and Postcardial, also named the Evolved Ancient Neolithic (EAN).

This classical/traditional denomination follows the proposals of Professor Jean Guilaine (Guilaine et al., 1972),¹ and was used by archaeologists to isolate/characterize the Ancient Neolithic in the Northeast of the Iberian Peninsula. Indeed, some of these terms are still in use nowadays. The best known technological assemblage is the Cardial group, which covered the Western Mediterranean Sea from Italy to North Africa. This pottery is well known as an extensive phenomenon where the toothed shell imprints became the main decorative style on medium-sized jars, bowls and pots, forming simple and geometric motives while southern examples also include zoomorphic or anthropomorphic representations. The typometry of the Epicardial vases is similar to that of the Cardial, although some of the former presented larger sizes. In contrast, parallel, orthogonal and arcuate plastic applications in the shape of cords were frequent and formed complex patterns. The best known assemblages, because of the total amount of vessels and their quality of preservation, belong to the latter periods (Postcardial/EAN). In this phase, vertical angles with burnished surfaces or corrugated surfaces are also documented. Furthermore, the location of the decorative cords in a horizontal, vertical or arched position called "moustache" or "bucrania" became the main stylistic expression, a decoration which shared common elements with the French early Chasseen or Chambon cultures.

Traditionally, research in the Iberian Neolithic focused on the ceramic archaeological record has considered the Cardial, Epicardial and Postcardial to be sequential phases located in different time periods of between 200 and 300 years of length. Although concerns have been raised about the possible contemporaneity of the Cardial and Epicardial periods (Van Willigen, 2004), more recent research has indicated a possible overlap between the later Cardial years and early Epicardial times in the northeast of the Iberian Peninsula (Gibaja and Clop, 2012). Nevertheless, it should be noted that Bayesian modeling has not been incorporated yet to the discussion. Given that such statistical models tend to improve precision and reduce the date's calibration ranges it will be only after new research is done that this possible overlap will be confirmed. Regardless of specific ^{14}C discussions, a consecutive sequence for the Cardial and the Epicardial has been justified in the studied region by variation in ceramic typology and decoration techniques, a distinction which is coherent with data from ^{14}C dates (Barceló, 2008; Cebrià et al., 2014; Martín et al., 2011; Morales et al., 2010). Therefore, although an overlap might exist when considering the region as a whole, Cardial and Epicardial ^{14}C dates from the Barcelona plain show that this is not the case in the studied area.

In the last 10 years, a phase preceding the Cardial period has also been proposed. Although only a humble quantity of sherds has been identified to date, the existence of this "impressa" phase enjoys a high scientific consensus which has been validated between researchers. Initially, the impressa phase had only been identified in north-east Italy, however, in the recent years, new data has shown it would also extend to the Languedoc, Catalonia and the Alicante peninsula (Guilaine et al., 2007; Bernabeu et al., 2009; Oms, 2014).

The archaeological works in the city of Barcelona in the last 25 years have allowed the recovery of a new important set of archaeological data from the Early Neolithic. Moreover, the Raval

¹ This author distinguished several chrono-morphological phases. The first one, the Former Néolithique or *Néolithique ancien*, corresponded with the Cardial culture or *facies impressa* and its epigones, the Epicardial horizon. Both horizons are placed between 5600 and 4500 cal BC. The third one, the Evolved Ancient Neolithic (*Néolithique Ancien Évolué*) or *Néolithique Primitif Moyen*, was characterized by unprecedented innovations in pottery production such as the Montboló and Molinot features (Guilaine et al., 1972; Mestres, 1981).

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