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Mats as a Building Material Evidence from the Southeast of the Iberian Peninsula during the Late Prehistory

Les nattes comme matériau de construction Témoignages du sud-est de la péninsule Ibérique au cours de la Préhistoire récente

María PASTOR QUILES

Abstract: In archaeological research, mats are usually present in domestic spaces of the past as equipment and isolation elements, as surfaces in which to sit, work or rest. They can also be employed to build with them, but this possibility is not often considered. In this paper we address the use of vegetal woven mats as a construction material employed to erect walls or roofs, specifically in Late Prehistory structures of the Iberian Peninsula and their identification through architectural remains recovered in archaeological contexts. To do so we focus on the assemblage of hardened mud building fragments with well-preserved imprints from the Chalcolithic site of Les Moreres (Crevillente, Alicante, Spain), where several structures of circular ground plan were excavated. Those findings allow to propose the use of mats inside their building parts, stressing the highly informative potential of that sort of earthen archaeological remains which have been frequently undervalued or ignored, and the necessity of considering a wider array of elements as prospective construction materials from prehistoric times.

Keywords: Matting; weaving; architecture; imprint; daub fragments; Metal Age; Western Mediterranean.

Résumé : Les nattes sont généralement présentes dans les espaces domestiques des sociétés passées comme éléments d'équipement et d'isolation, comme assises, comme surfaces de travail ou de repos. Leur utilisation peut être envisagée pour séparer des espaces, aussi bien à l'intérieur qu'à l'extérieur des bâtiments, pour la fermeture des portes et des fenêtres ou pour créer des espaces ombragés afin d'abriter les humains, les animaux ou des biens matériels. Elles peuvent également être employées dans la construction, même si cela n'est que rarement pris en compte dans les recherches archéologiques. Pourtant, les nattes ont été utilisées à des fins de construction dans de nombreuses sociétés à travers le monde, afin d'aménager des dispositifs architecturaux variés, voire pour la réalisation de structures entières. Elles sont utilisées pour la construction des parois dans de nombreuses régions, par exemple en Asie du Sud-Est, en Inde ou dans des pays africains tels que l'Éthiopie, ainsi que dans la réalisation de toitures dans de nombreux pays d'Afrique et au Proche-Orient. Dans cet article, nous souhaitons mettre en évidence l'usage des nattes dans la construction des murs et des toitures au cours de la Préhistoire récente de la péninsule Ibérique.

Le bâti de la Préhistoire récente dans le sud-est de la péninsule Ibérique est réalisé à partir de matériaux prélevés localement : terre, végétaux, bois et pierre. La réutilisation des produits dérivés des activités agropastorales, tels que la paille ou le fumier, est également attestée. L'emploi de matériaux fabriqués à partir de plantes, comme la vannerie, les cordes et les nattes, est également envisageable. Les produits de nature organique tels que les nattes se conservent sous certaines conditions en milieu humide ou extrêmement sec ou lorsque les fibres végétales sont carbonisées.

Toutefois, leur utilisation peut être aussi identifiée grâce à l'étude des empreintes qu'elles ont laissées sur des matériaux en terre crue ou cuite tels que les poteries ou les débris de terre à bâtir. Les recherches menées dans la péninsule Ibérique ont mis en évidence des restes de terre avec des empreintes de végétaux tressés. Bien que ces matériaux n'aient pas fait l'objet d'études plus poussées, ils ont été parfois assimilés à des restes d'éventuels récipients plutôt qu'à des matériaux architecturaux.

Dans cet article, nous nous concentrons sur l'étude des restes de matériaux en terre avec des empreintes bien conservées provenant du site chalcolithique de Les Moreres (Crevillente, Alicante, Espagne), situé dans le sud-est de la péninsule Ibérique, où plusieurs structures de plan circulaire-ovale ont été fouillées il y a quelques décennies. Un bon nombre de ces restes, retrouvé en contexte domestique, présentent des empreintes de nattes. Ces dernières semblent avoir été réalisées grâce à l'entrelacement de groupes de tiges, peut-être de l'herbe de sparte (*Stipa tenacissima*) ou une autre fibre à la morphologie similaire. Les empreintes des tiges ont une section circulaire de quelques millimètres de diamètre, indiquant une utilisation de la plante sans traitement préalable. *Stipa tenacissima* est une espèce végétale abondante encore de nos jours autour du site, et son exploitation a été d'une grande importance dans la région pendant des milliers d'années et jusqu'à l'époque contemporaine. Les fragments de terre étudiés montrent également que les nattes étaient disposées sur un panneau de roseaux ou de branches disposés en parallèle. La terre appliquée sur cette trame végétale était lissée à la main, et les empreintes digitales ont été conservées. Le type de tressage visible sur les différents fragments avec des empreintes de nattes est toujours du même type, dit « en damier ». D'après l'analyse macroscopique de ces fragments provenant de Les Moreres, les nattes pourraient avoir été utilisées sur la face intérieure des parois ou faire partie de la toiture. Une des hypothèses envisagées est que les nattes étaient employées comme isolant ou pour faciliter l'accrochage de la terre à bâtir.

Ces découvertes permettent de proposer l'utilisation de nattes à l'intérieur des toitures et/ou des murs, soulignant le haut potentiel informatif de ce type de matériau archéologique en terre, qui a souvent été sous-estimé ou ignoré. Cependant, les observations d'empreintes de nattes employées comme matériau de construction sont encore peu nombreuses pour la Préhistoire récente de la péninsule Ibérique. Pour faire progresser cette recherche, il est essentiel de prendre en compte la possibilité que les nattes aient joué un rôle dans l'architecture et systématiser l'étude des empreintes sur des restes en terre.

Mots-clés : natte ; tressage ; architecture ; empreinte ; fragments constructifs de terre ; âge des Métaux ; Méditerranée occidentale.

1. INTRODUCTION

Earth is one of the most widely used building materials in the world and has been used to shape the living spaces of many societies around the planet since at least the Neolithic period, alone or in combination with other materials, through diverse building techniques. In archaeological contexts, earth construction can be materialised, among other ways, with the preservation of hardened mud remains which, considering their specific traits and fragility, can be studied just as other components of the archaeological record. This materiality can be approached with diverse techniques based on their macroscopic analysis (e.g. García López and Lara, 1999; Belarte, 1999-2000; De Chazelles, 2003; Knoll and Klamm, 2015; Pastor, 2017). The study of these earthen architectural remains when they are available provides valuable insights into the use of materials, techniques and building practices in the past. These elements contain information about the architectural uses of the earthen mixtures, the additives they can contain and their application. They also provide valuable testimony of other materials, such as those of an organic nature -wood, branches, canes, ropes, etc.-and of which in most cases hardly any remains are preserved, but that are reflected in the imprints generated in the mud when they were put together in a construction. Mats and other technologically similar products are of course among these elements of perishable material culture.

Due to its organic nature, mats, basketry, and ropes – individual, braided, or twisted –, cannot always be detected in the archaeological record. Nevertheless, they are present in certain sites, preserved in special environmental conditions (see Wendrich, 1991, p. 11; e.g. Montorfani, 2019), as for example in waterlogged sites⁽¹⁾, or also as carbonised remains (Jover and López, 2013). In the Iberian Peninsula, this sort of vegetal evidence is

known from the first sites of the Neolithic, in the 6th millennium BC, with some examples from previous chronologies (Aura et al., 2020). Another way in which the presence of these fundamental organic materials can be recorded is through their impressions, as in ceramics (Holmes, 1885; Kenyon, 1981; Papí, 1992-1994; Elster, 2003; Rovira, 2006; Hurcombe, 2008; López, 2011) and other earthen elements (Alfaro, 1984; Harris and Conna-way, 2015; Moralejo et al., 2015; de Chazelles and Leal, 2018), of diverse forms, including spheroids or balls (Adovasio, 1975; Wendrich, 2005).

Vegetal woven surfaces or mats can be used as a building material in roofs, walls, and other architectural parts, as it happens in diverse contemporary traditions around the globe and is also shown by ethnographic sources, but these uses of mats are rarely considered in archaeological studies. In the present paper we address this topic and present a directly related key-case study from the Late Prehistory in the South-eastern region of the Iberian Peninsula. The macroscopic analysis carried out of the earth building materials from the Copper Age, second half of the 3rd millennium BC settlement of Les Moreres, in Crevillente (Alicante, Spain), allows to infer that these materials were employed in its architecture. These findings make possible to raise questions about how and why they were included as building elements, as well as about the extent of this practice in other prehistoric sites.

2. USES OF MATS AND THEIR CONSIDERATION AS A BUILDING MATERIAL

Construction materials identified in most settlements of the Late Prehistory, including the ones in the South-east of the Iberian Peninsula, are obtained from resources

present in the natural environment of the enclaves, usually available at short distance – earth, plants, wood, stone –, as well as from the reuse of waste from their main economic practices – straw, dung. Faunal remains and ceramic fragments are among the residues of daily activities and products also incorporated in architecture, embedded in mud mortars. Added to these is the use of materials produced by these communities, whether they were manufactured expressly or exclusively to build with them and generally having diverse applications. This group of materials includes those made from plants, such as ropes and mats.

In the archaeological studies of domestic contexts, vegetal woven surfaces or mats are considered mostly covering floors (Kenyon, 1957, p. 114, plates 12 and 13; Kramer, 1982, p. 119; Wendrich, 2005, p. 336; Cameron, 2017) and non-portable domestic installations (fig. 1), such as benches. Mats are and have been employed as surfaces in which to sit, rest and work. Thanks to ethnographical observations and ethnoarchaeological research, we can bear in mind that mats are also used in buildings to close openings and separate areas (Kuoni, 1981, p. 172 and 254; Agorsah, 1985, p. 105, fig. 2; Van Gijn, 1986, p. 185, plate 3), to repair (Kelly et al., 2005, p. 407) and isolate building parts. Furthermore, mats are employed to generate areas protected from direct sunlight, for people, animals, or products. Nevertheless, mats are not usually considered as a building material per se inside walls and roofs.

But mats have been used for main building purposes in many societies around the world, applied in various structural parts, even destined to build the whole structure (e.g. Oliver, 1971, p. 118; Ochsenschlager, 2004). Their use as the main material in walls is practiced in many regions, in Southeast Asia, in India or Ethiopia (Oliver, 1971 and 1987; Steen et al., 2003, p. 136 and 147), as well as in the roofs in many African countries (Lander and Niermann, 1980, p. 30; Frobenius-Institut, 1990, plate 58), and in the Near East (Lloyd, 1963, fig. 15; Aurenche, 1977, p. 24; Guidoni, 1977, p. 11; Ochsenschlager 2004, p. 99; Levy, 2018, p. 54). Although the use of mats as a construction material is documented in various temporal and geographical contexts, it is a practice very little addressed by archaeological. In this sense, it is important to note that constructive imprints of mats have also not been the subject of attention in specialised studies about the study of earth building remains.

Some works corresponding to the prehistoric periods of the Iberian Peninsula have recorded the presence of mat imprints in hardened mud fragments that could correspond to architectural uses, but this presence has either not been interpreted as a result of its function as a construction material, but rather as remains or impressions of possible containers (e.g. Moralejo et al., 2015; Aura et al., 2020), or would not have been the object of further attention.



Fig. 1 – Bed built with mud and reeds, covered with a vegetal mat (Ochsenschlager, 1974, p. 172).

Fig. 1 – Lit construit avec de la terre et des roseaux, recouvert d'une natte (Ochsenschlager, 1974, p. 172).

3. THE EVIDENCE FROM LES MORERES (CREVILLENTE, ALICANTE)

Main archaeological evidence of the use of vegetal woven mats used as construction material, in combination with mud mixtures, comes from the Chalcolithic site of Les Moreres (Crevillente, Alicante, Spain; González, 1983, 1984 and 1986; González and Ruiz, 1991-1992), dated to the second half of the 3rd millennium BC. These materials have been analysed in a systematic macroscopic study of prehistoric daub fragments from the southeast of the Iberian Peninsula (Pastor, 2019). The site of Les Moreres was excavated several decades ago using a grid system and the remains of oval buildings were documented, built with and without stone socles, part of them having elevations made of vertical wooden posts covered with mud. During the archaeological interventions, a numerous set of earth building elements of great interest were recovered, with wooden imprints, of circular and angular section, as well as of reeds and sticks, combined and arranged in the construction parts, joined with ropes, and covered with mud mortar (Pastor, 2021).

Among this assemblage of earthen architecture remains, around 60 fragments show the negative imprint left by a vegetal surface made with groups of parallel stems, arranged in bands interwoven perpendicularly to each other, that can be interpreted as mats. These would be made by interlacing groups of stems, possibly of Esparto grass (*Stipa tenacissima*), or another fibre with a similar morphology, which preserved its circular section of a few millimetres in diameter and would therefore have been used raw. Esparto grass is a plant species abundant today around the site and whose exploitation has been of great importance in the area for thousands of years and up to

contemporary times (Pliny the Elder^[2]; Cavanilles, 1795, p. 226; Kuoni, 1981, p. 255; Belmonte et al., 2017).

These impressions do not appear on flat surfaces, but superimposed on several negative imprints of constructive origin, arranged in parallel and in most cases probably corresponding to canes or maybe also sticks. Therefore, we can infer that the mat was located adjacent to a panel of these vegetal elements. In some cases, this technique could also have been used on thicker sticks or branches. The type of weave observed would be the same in all, a plain, tabby or checkerboard weave (Alfaro, 1980, p. 112; Wendrich, 2000, p. 258; Makkay, 2003, p. 323), with some possible exceptions which may be related to the beginning, the closure, or the ends of the mat (Elster, 2003, p. 246, fig. 6.31c; Fajardo et al., 2015, fig. 3). In many of the fragments with mat impressions, an external, smoothed opposite surface can be distinguished, in many of them with traces which would be the result of smoothing with the fingers of the hand in the same direction (fig. 2). Due to the features described, these construction fragments may correspond to the inside of walls, which would imply the use of mats inside this structural part of the Chalcolithic buildings at Les Moreres.

However, it cannot be ruled out that these pieces correspond to other structural parts, such as roofs covered with mud. A small group of these fragments, which show the negative of a mat put over canes or sticks on one side, have abundant small vegetal negatives on the opposite (fig. 3), and could be associated with the roofs. Mats could have been used as part of the beamwork, between a surface of canes or sticks and the layer of mud that would have covered it, maybe also with a superimposed layer of vegetal materials in the outer side. In this case, the matting could have been laid out to help support other building materials (Kuoni, 1981, p. 254), specifically the

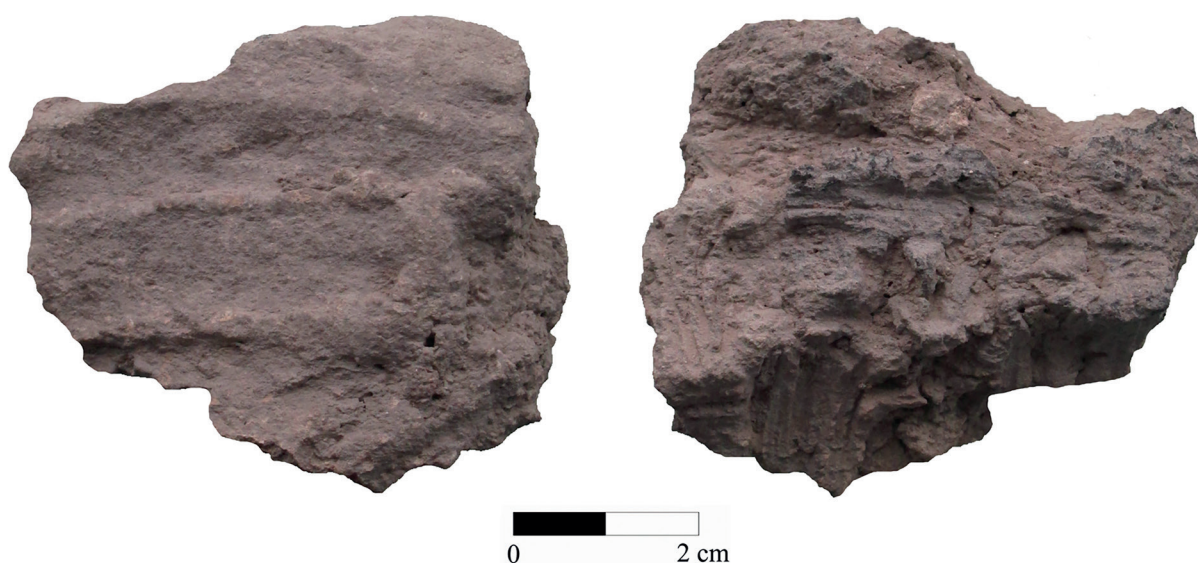


Fig. 2 – Both sides of an earth building fragment from Les Moreres (Crevillente, Alicante, Spain), with smoothing marks on the outer side and mat imprint on the other.

Fig. 2 – Les deux faces d'un fragment de construction en terre provenant de Les Moreres (Crevillente, Alicante, Espagne), avec des marques de lissage sur la face extérieure et une empreinte de natte sur l'autre.

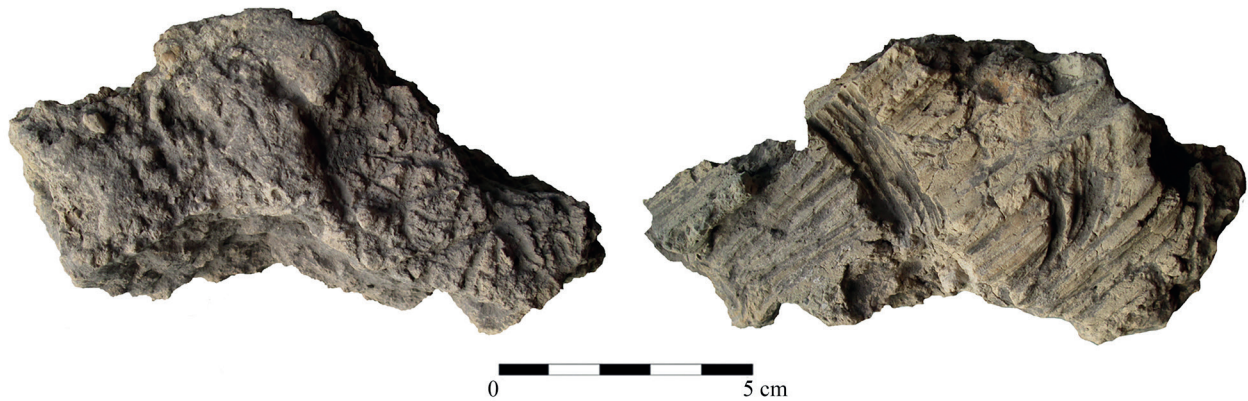


Fig. 3 – Both sides of an earth building fragment from Les Moreres (Crevillente, Alicante, Spain), with thin vegetal negatives on one side and mat imprint on the other.

Fig. 3 – Les deux faces d'un fragment de construction en terre provenant de Les Moreres (Crevillente, Alicante, Espagne), avec des négatifs végétaux sur une face et une empreinte de natte sur l'autre.

layer of mud over the canes. Mats could have been used in the architectural parts for its insulating properties (Rasmussen, 2007, p. 160), to improve the adherence of the external cladding in the walls or for other reasons that remain unknown.

4. FINAL REMARKS

Mats would have been an essential product widely present in domestic spaces of the past, as shown by research on prehistoric sites in the south-eastern Iberian Peninsula, although they are not always visible in the archaeological record, as it also happens with related technologies based on organic materials. They are a very versatile handcraft which can be stored, transported (fig. 4), and exchanged. The uses of these productions to be considered are varied and architecture should not be excluded from them.

The studied earth building remains from the Copper Age site of Les Moreres are a great example of the employment of mats in architectural parts, combined with other materials of vegetal origin and, most visibly, with earthen mortars. This assemblage highlights the enormous informative potential of archaeological hardened mud, as well as the importance of considering a wide array of materials with a prospective building function, from prehistoric times to the present day.

Although the available evidence is still too partial to provide a greater historical view on the development of this building practice in the Iberian Peninsula during the Late Prehistory, the use of mats or basketry elements for building purposes may have been relatively common and practised in different chronologies. To make progress in this line of research, it is essential to consider this possibility during excavation processes and when interpreting the evidence, as well as during the specific study of mat remains that may have been preserved and also of their imprints on earthen fragments. Only this will make

possible to put forward hypotheses on the territorial and chronological distribution of this construction practice, to determine the extent of the use of these materials, their location, and their functionality in the buildings.

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NOTES

- (1) See for example the unpublished poster of M. Andonova M., S. Million and I. Stelzner I. "Archaeobotany of Basketry: Identification of Neolithic Coiled Baskets from the Pile Dwelling Settlements of Lake Constance, Germany", in *Abstracts of the Integrated Microscopy Approaches in Archaeology Workshop (Reading, 15th-16th February 2020)*, https://www.academia.edu/45452285/Archaeobotany_of_basketry_identification_of_Neolithic_coiled_baskets_from_the_pile_dwelling_settlements_of_Lake_Constance_Germany
- (2) Pliny the Elder, *The Natural History*, XIX, 26.

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Fig. 4 – Mats used as a building material ready to be transported in southern Iraq (Roaf, 1990, p. 50).

Fig. 4 – Des nattes utilisées comme matériau de construction prêtes à être transportées, dans le sud de l'Irak (Roaf, 1990, p. 50).

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