Spinning the World: A Final Comment

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Abstract:

The paper provides a short discussion on textile archaeology, including historiographical notes and the explanation of the latest textile tools' methodology, and charts new research venues for the study of textile production in Portugal and Spain. The numerous and varied research themes within textile archaeology should make archaeologists rethink the central role of textiles in the ancient Mediterranean, and the wide range of new perspectives that their analysis can bring to the study of cultural, socioeconomic, and political aspects of ancient societies in Portugal and Spain.

Key words: *Textile Archaeology, Textile Tool Methodology, Socioeconomic Aspects, Creativity.*

Resumen:

Este artículo ofrece una breve discusión sobre la arqueología del tejido, incluyendo notas historiográficas y la explicación de la última metodología en el estudio de herramientas textiles, así como expone nuevas vías de investigación para el estudio de la producción textil en Portugal y España. Los numerosos y variados temas de investigación dentro de la arqueología del tejido deberían inspirar una reconsideración del papel central que tuvieron los tejidos en el antiguo Mediterráneo, y la amplia gama de nuevas perspectivas que su análisis puede aportar al estudio de los aspectos culturales, socioeconómicos y políticos de las sociedades antiguas en Portugal y España.

Palabras clave: *Arqueología del Tejido, Metodología de Útiles Textiles, Aspectos Socioeconómicos, Creatividad.*

INTRODUCTION

The publication of Carmen Alfaro's *Tejido y cestería en la Península Ibérica. Historia de su técnica e industrias desde la Prehistoria hasta la Romanización* in 1984 marked the beginning of a field of expertise that was, however, not fully explored by archaeologists until recently. In fact, it was only in the 2000s that scholars got more interested in textiles and therefore new projects opened new windows into textile research (see Alfaro in this volume, and Gleba in this volume), both from archaeological perspectives and, more recently, from historical ones looking at clothing as material culture (e.g. Riello and Parthasarathi 2009; Rublack 2010; Welch 2017; Hanß 2019).

Still, compared to the numerous publications in the field of textile archaeology in Europe (Gleba 2008; Gleba and Pásztókai-Szeöke 2013; Andersson Strand and Nosch 2015; Grömer 2016; Brøns and Nosch 2017), and in the US (Brumfiel 1991; Asturias de Barrios and García 1992; Arnold *et al*. 2007; Halperin 2011; Dransart *et al*. 2012; Costin 2013), textile research in Portugal and Spain remains quite unmapped. The collection of papers gathered in this volume demonstrates, however, the potential of textile archaeology in the Late Bronze – Early Iron Age Iberia. This volume encompasses both new and not-so-new case studies and facilitates access for the researchers interested in Bronze and Iron Age textiles in Iberia to the latest evidence from different regions – Extremadura, Andalusia, Alicante, Balearic Islands, Madrid-Toledo. It is also accessible to an English audience, which was one of our major goals since most articles on textiles from Iberia are written mostly in Spanish (Alfaro *et al*. 2004; Alfaro and Karali 2008; Alfaro *et al*. 2011; Vilches Suárez 2015; Gomes 2017).

Carmen Alfaro (in this volume) has already pointed out some of the contributions' highlights and Margarita Gleba (in this volume) has focused on the scientific methodology of textile analysis and textile *chaîne opératoire*, so I will focus here instead on the potential future research on textiles in Spain and Portugal. The aim is charting new research perspectives that would contribute to the study of past societies and enormously enrich our understanding of Bronze and Iron Age societies in this cross-cultural region between the Atlantic Ocean and the Mediterranean Sea.

TEXTILE ARCHAEOLOGY

The study of metals, lithics, and pottery from archaeometric perspectives is well developed in Portugal and Spain (e.g. Capel Martínez 1999; García Rosselló and Calvo Trias 2013; Pereira *et al*. 2017; Armada *et al*. 2019). However, the scientific methodology for the analysis of archaeological textiles and tools is still largely disregarded, despite the vast literature on the topic (Barber 1991; Emery 1994; Gleba 2008; Andersson Strand and Nosch 2015; Grömer 2016). Usually associated with women and domestic activities, the study of textiles has been traditionally neglected by a predominantly male scholarship (Harlow and Nosch 2014: 3, 11; Brøns 2017: 11; Marín-Aguilera 2019: 230-231). Even today, most textile researchers are women (e.g. Arnold *et al*. 2007; Rublack 2010; Gleba and Pásztókai-Szeöke 2013; Peck 2013; Brøns and Nosch 2017).

Fig. 1: 19th-century Mapuche spindle from the Museo de Historia Natural de Concepción, Chile (Author).

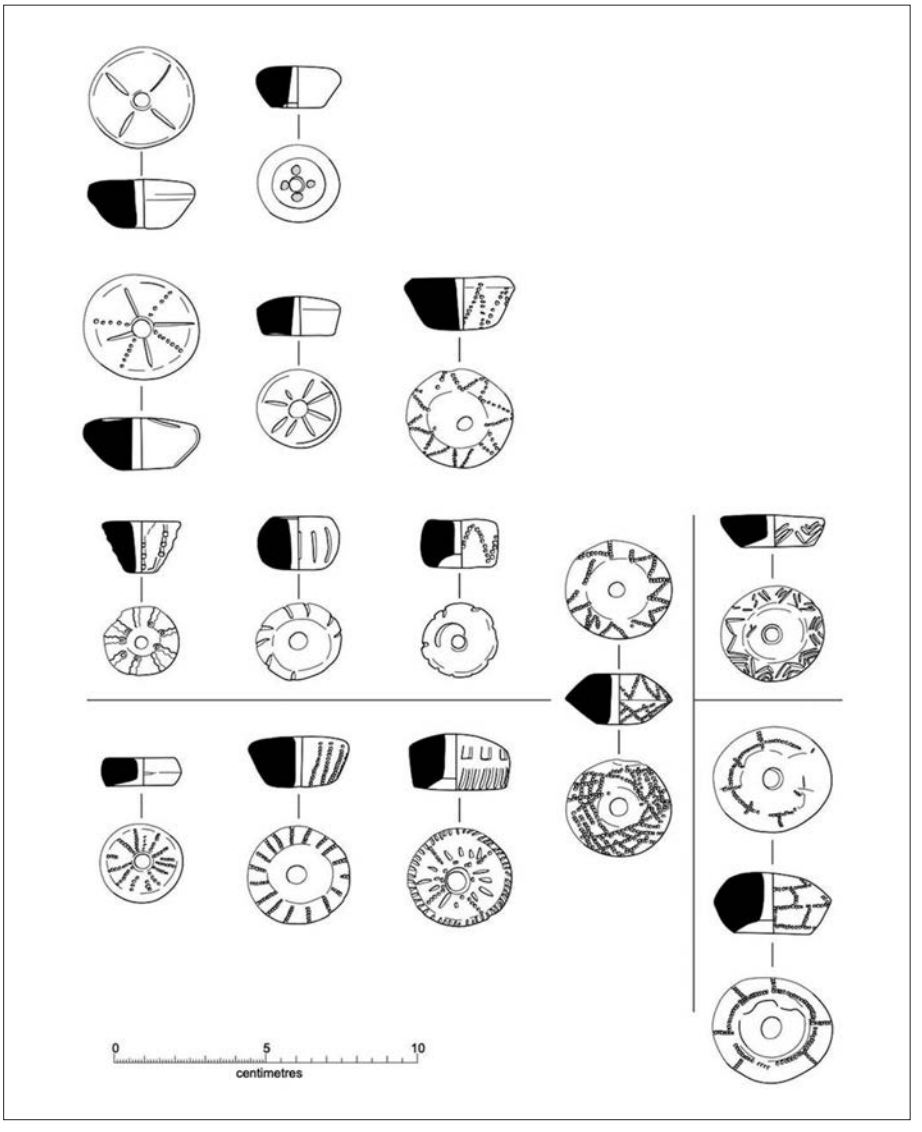

Fig. 2: Spindle whorls from Cancho Roano with incised decoration (Image: Vicki Herring, after Berrocal 2003: 236, fig. 9).

Textiles and textile technologies are known even before societies started to produce ceramic and metals (Harlow and Nosch 2014: 3), and they have been a basic need from the Neolithic onwards in Europe and many other world regions (Barber 1991; Kriger 2006; Riello and Parthasarathi 2009). Yet, to identify different chronologies we use stone technology (Palaeolithic and Neolithic), metals (Bronze and Iron Ages), 'in-betweeners' (Chalcolithic), pottery (Pre-ceramic and Ceramic period), writing (Prehistory, Protohistory, and History), colonialism (Prehispanic/Precolumbian vs. Hispanic/Colonial period), and Eurocentric approaches (Formative/Pre-Classic, Classic and Postclassic periods in Mexico and Central America, analogous to those of the 'Classical civilisations' in Europe). Textile technologies have never been thought as chronological markers, even though many of them are clearly associated with particular historical periods and regions (Pacey 1991; Petersen and Wolford 2000; Riello and Parthasarathi 2009; Dransart *et al*. 2012; Marín-Aguilera *et al*. 2018; González Vergara 2019).

Beyond chronological indicators, Bronze and Iron Age textile technologies are far from rudimentary. In fact, textile technology has barely changed since its conception (Albers 2017: 4-5). Since weaving needs a minimum of equipment but is time-consuming, innovations

Fig. 3: Spindle whorls (above) and loom weights (below) from El Turuñuelo de Guareña (Image: Esther Rodríguez González, as published in Marín-Aguilera *et al*. 2019).

have mostly accelerated the weaving process by developing time-saving devices, but have not changed the basic principle of weaving (Albers 2017: 1).

There are different ways of preparing the thread (see Gleba in this volume) as well as different looms identified for the Bronze and Iron Ages in the Mediterranean and, more generally, in Europe (Alfaro 1984; Barber 1991; Gleba 2008; Grömer 2016). For spinning, the most common archaeological objects are spindles (fig. 1) – a straight rod, designed to twist and spin fibre into yarn, and whorl or flywheel – small object fastened near the bottom or near the upper end of the spindle, used to increase and maintain the speed of the spin (fig. 2). For weaving, the usual finds in archaeological sites are loom weights, associated with the warp-weighted loom (fig. 3); but there are other types of looms used in the Bronze and Iron Ages that do not need weights and, therefore, are more difficult to identity in the archaeological record (fig. 4).

Spindles are usually made of wood or bone and are rarely preserved in the archaeological record of Spain and Portugal, whereas spindle whorls can be made of wood, bone, metal, coral, stone or clay – the last two materials survive better archaeologically. Loom weights are usually made of stone or clay; in the latter case, if the loom weight was not fired, it might be more difficult to recover archaeologically. Thus, as the traditional aphorism reads, *absence of evidence is not evidence of absence*: the fact that we do not find archaeological evidence for spindle whorls or loom weights does not mean that they did not exist or that they were not used. Similarly, the fact that we do not find loom weights does not necessarily mean that people were not weaving, as they could have used another type of loom (e.g. horizontal ground loom or the vertical two-beam loom).

Looms are likewise rarely preserved archaeologically, for they are made of (perishable) wood and easily portable. Even in the 19th century, the accommodation of a loom necessitated only a tiny transformation within a room or the seasonal conversion of a house area into a textile workshop when there were no agricultural tasks (Mohanty 2006: 107-115; Nevell 2008). These arrangements leave unfortunately few archaeological traces, making it very difficult to identify textile production areas and indeed looms. The evidence of loom weights points to the existence of a warp-weighted loom; but unless the loom was not destroyed *in situ*, i.e. leaving loom weights roughly in place, it is difficult to identify its specific location (Barber 1991: 102). In fact, without this evidence, it is not possible to know how many looms existed or were being used contemporaneously on site. Further, loom weights could be stored and thus not in use, or could have fallen from the upper floor where they were either in use or in storage.

TEXTILE TOOL METHODOLOGY

Spindle whorls are used by archaeologists to determine the thickness of the thread spun. The weight, diameter, and shape of the whorls are the most important parameters for calculating the type of yarn. They are used to estimate the diameter of the thread as well as the moment of inertia and rotational speed – and thus approximate

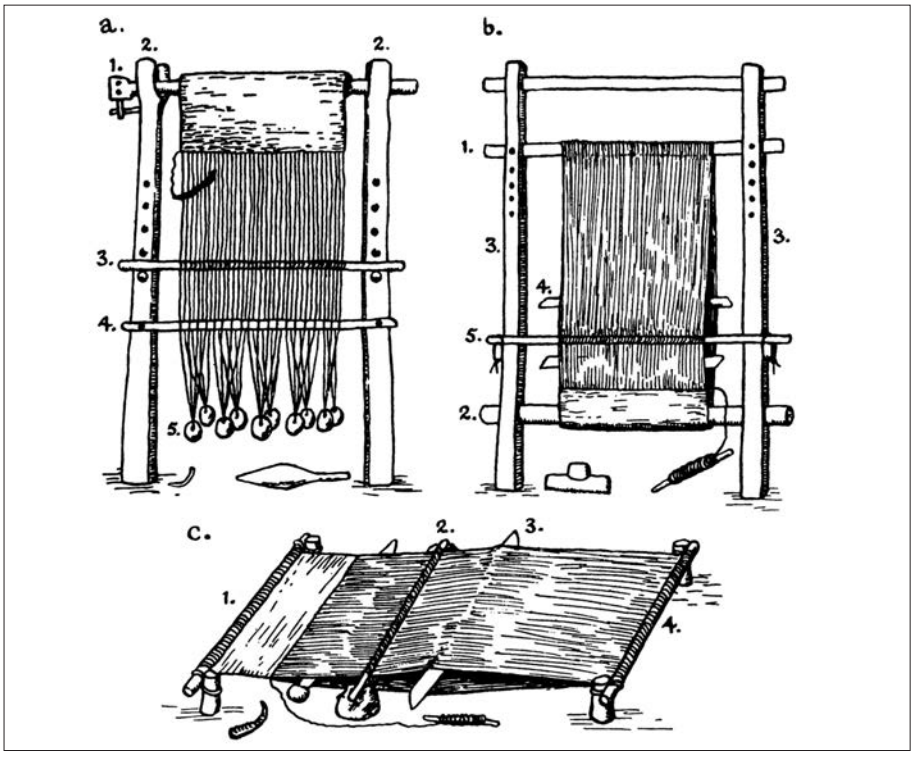

Fig. 4: Types of looms in the Mediterranean Bronze and Iron Ages – warp-weighted loom, two beam, and ground floor (after Crowfoot 1937: 37, fig. 1).

spinning time (Grömer 2005; 2016: 86-87; Martial and Médard 2007; Mårtensson *et al*. 2009; Chmielewski and Gardyński 2010).

Smaller whorls cause more and faster rotation, whereas larger spindle whorls give the spinner more time to feed the yarn onto the spindle and facilitate better control over the technique. Small and light spindle whorls are thus not the evidence of infants' learning how to spin thread, but rather indicate the existence of highly skilled spinners (Baitzel and Goldstein 2018), and most likely the use of the supported technique that allows a greater control over the quality of the thread (Grömer 2005; Ibarra *et al*. 2018).

The fibre used will define the more suitable spindle whorl to use. Experiments have shown that smaller whorls work better for shorter fibres, such as cotton but also wool, and the resulting thread would be finer – the tiny moulded and burnished whorls at Cancho Roano are a great example here (Marín-Aguilera 2019: 239). Spindle whorls weighing around 20-35 g are more suitable for spinning flax, whose fibres are longer and with more overlap, longer wool staple or for plying (Grömer 2016: 88-89). The latter was the case, for instance, for the whorls found at La Mata (Marín-Aguilera 2019: 237).

Archaeological experiments have produced insightful information regarding the functional properties of loom weights (Cutler *et al*. 2013; Andersson Strand and Nosch 2015). For optimal weaving, between 5 and 50 warp threads should be attached to each loom weight (Mårtensson *et al*. 2009: 392; L. Hammarlund, personal communication, June 11, 2018). The thread diameter determines the necessary tension on the loom, but the degree of twist and fibre quality also play a crucial role (Andersson Strand 2010: 18; Grömer 2016: 112). Thick and thin threads usually need different tension in the loom, which is obtained by using lighter or heavier weights and/or by varying the number of threads per loom weight. This is important, because if the weaver attaches heavy loom weights to very thin thread, the latter will most likely break.

The shape and thickness of the loom weight is also a significant factor, for it would determine a higher or lower density of warp threads, as well as the loom set-up, e.g. loom weights hanging more or less closely together (Mårtensson *et al*. 2009). Depending on this, the fabric would be denser or looser in its composition, and this affects its visual and physical properties, e.g. a denser fabric would protect better from the cold.

The type of weaving technique is likewise an important factor when estimating the results of the calculations. A plain weave or tabby (*tafetán* in Spanish) is a basic weaving technique in which one warp thread passes over and under a single weft thread forming a simple criss-cross pattern. In a 2/2 twill weave (*sarga* in Spanish) each warp thread passes over two weft threads, then under two, making a diagonal pattern, e.g. chevron, diamond, etc. Tabbies are known as early as the Neolithic and have been documented in the Chalcolithic of Iberia at Los Millares (see Gleba in this volume; Jover Maestre *et al*. in this volume), and twills have been attested at Casas del Turuñuelo for the first time in the Iberian Peninsula (Marín-Aguilera *et al*. 2019).

The weaving technique affects the number of loom weights for the loom set-up. The number of loom weights will vary depending on the size of the textile the weaver wants to make, as well as on the technique (s)he will use for making it. In a warp-weighted loom, a square metre of 2/2 twill can be made by using either two or four rows of loom weights, the latter requiring double the number of loom weights, and consequently more metres of yarn; whilst a square metre of tabby would require two rows and the same number of loom weights as a two-rows made 2/2 twill (see Marín-Aguilera 2019; Marín-Aguilera *et al*. 2019). The number of loom weights is therefore never indicative of the number of looms in a given site, but might be indicative of household or workshop production. At Poggio Civitate in Italy, archaeologists have found more than 1,000 textile implements, identifying a workshop on site (Gleba 2007; Cutler *et al*. 2020); and the same is the case for Gordion in Turkey (Burke 2005). The workshop excavated at Coll del Moro is the first (and only one until now) evidencing flax processing (Rafel i Fontanals *et al*. 1994), yet the 107 loom weights recovered are not enough to identify a textile workshop.

Mathematical calculations form thus the core of textile technologies (Brezine 2009; Andersson Strand and Nosch 2015; Albers 2017), but the type of selected fibre is also crucial, as it would determine the type of spindle whorl used, as well as the warp tension and therefore the number of loom weights and the ratio of threads/loom weight on the loom (Grömer 2016; Marín-Aguilera *et al*. 2019; Cutler *et al*. 2020). Fibre assumptions have been proven wrong in many occasions, as many fibres are very similar and only SEM analysis can discriminate between them. For instance, Viking fine cloth was traditionally thought to be made out of flax, but a recent study has demonstrated that fine textiles were also made of hemp (Skoglund *et al*. 2013).

To conclude, it is very important to study the technical specifications of textile tools and fibres (and their archaeological evidence/absence) to determine the type of textiles that different groups were manufacturing, as this brief section (with references) has demonstrated.

WHAT TEXTILE ARCHAEOLOGY CAN TELL US

From raw materials to product, the study of textiles contributes to a more comprehensive understanding of different societal and economic aspects. An encompassed approach to the study of textiles has recently showed the development of different Mediterranean textile cultures by looking at specific spinning and weaving techniques (Gleba 2017; Gleba *et al*. 2018), and the range of textile products and possibilities by functionally analysing textile tools (Cutler *et al*. 2013; 2020; Luberto and Meo 2017; Marín-Aguilera 2019; Marín-Aguilera *et al*. 2019).

Evidence of the use of plant fibres for baskets, shoes, cords, and textiles is well-known in the Iberian Peninsula (Gleba in this volume; Jover Maestre *et al*. in this volume); less so are animal fibres (but see Alfaro and Ocharán 2014; Marín-Aguilera *et al*. 2019). Yet, archaeobotany, and especially zooarchaeology, can provide insightful data on textile raw materials and thus on mobility, different livestock and land strategies that would further enrich our knowledge of ancient Mediterranean societies.

Sheep bone analysis indicates whether animals were kept for wool or meat (see Estaca-Gómez in this volume; Estaca-Gómez *et al*. in this volume), as well as transhumance (Heitz 2015; Valenzuela-Lamas *et al*. 2016). Sheep management and mobility have recently been identified by using isotopic analysis ($^{87}Sr/^{86}Sr$, $\delta^{18}O$, $\delta^{13}C$, and $\delta^{15}N$) in central Italy. This study has demonstrated divergent livestock strategies among Etruscan sites, and the association of urban centres with increasing control over their territories and the mobilisation of animal resources, which correlates well with textile production (Trentacoste *et al*. 2020). Understanding different managerial responses to livestock control and agricultural production in Spain and Portugal could help us get a better understanding of the development of

urbanisation in the Iberian period, as well as the impact of the Phoenician, Greek, and Roman colonisation from the ninth century BC onwards.

Mobility of products, communities, and craftspeople is indeed becoming a fashionable topic in Bronze and Iron Age studies. The spread of purple-dyed textiles followed the Phoenician arrival in the central and western Mediterranean (Marín-Aguilera *et al*. 2018; see also García Vargas in this volume); transhumance might have been behind mixed textile practices and cultures in southern Italy (Gleba *et al*. 2018); and the movement of weavers might have brought innovations in textile techniques during the so-called 'Minoanisation' of the Bronze Age Aegean (Cutler 2012), and mobile specialised textile production in the Iron Age (Foxhall 2011; Marín-Aguilera 2019). Using geospatial patterning in carbon ($\delta^{13}C$), nitrogen ($\delta^{15}N$), and non-exchangeable hydrogen ($\delta^{2}H$) composition of modern and ancient sheep proteins, researchers have recently proved how wool used in medieval Iceland in reality originated in Britain or northern Germany and acquired as traded good via trade networks (von Holstein *et al*. 2016). Provenance analysis of both textiles and sheep bones like the latter one would be extremely valuable for deepening our knowledge on trade routes in the Western Mediterranean Bronze and Iron Ages.

The analysis of faunal remains using biometric comparisons has recently shed light on selective sheep breeding practices in the Roman period, the impact of which can be seen earlier in southern Italy where the increase in size of livestock was concomitant of the Greek colonisation of Magna Graecia (Gaastra 2014). This type of studies, combined with ancient DNA, would be useful to determine whether there were different sheep varieties in Iberia (and the Western Mediterranean for that matter); and more importantly, if communities practised selective breeding aimed at getting diverse fleece qualities. That would point to a highly specialised manufacture of textiles before the arrival of the Romans in the region, and would help us get a clearer picture of sheep exploitation and use (see, for instance, Brandt *et al*. 2011).

Context is everything in archaeology, and a contextual study of textile production has already demonstrated the significance of textiles as ritual offerings in Iberia (see Berrocal-Rangel *et al*.; Rísquez Cuenca *et al*.; Prados and Sánchez Moral in this volume; see also Marín-Aguilera *et al*. 2019; Brøns & Nosch 2017; Vilches Suárez 2015), as well as its symbolism when deposited as grave goods (Gleba 2009; Gomes 2017). A more comprehensive contextual study would shed light on how visual textile production activities were, e.g. wether spinners and weavers were confined to private, almost invisible spaces at home. The evidence of Cancho Roano seems to suggest quite the opposite (Marín-Aguilera 2019: 246). If textile production was still difficult to disentangle from household production in the 18th-19th century even if it was specialised (Li 2009; Tsurumi 1990; Hafter 1995), there is a need to re-open the debate on maintenance activities and craft specialisation in the Bronze and Iron Age Mediterranean.

The archaeology of maintenance activities is well-developed in Spain, particularly in Barcelona, Jaén and Granada, and has greatly contributed to the study of household and gender activities (González Marcén *et al*. 2007; Montón Subías and Sánchez Romero 2008; Sánchez Romero and Cid López 2018). Textile production in the ancient Mediterranean is one of the economic activities traditionally associated with women (see Rafel i Fontanals 2007 for a discussion on the Iberian culture), deeply influenced by the image of Penelope weaving and waiting for the return of Odysseus. Weaving and spinning seem to be indeed identified as female activities in the Iberian world, where there is also iconography (see Prados and Sánchez Moral in this volume), but textile production was carried out also by men in the Near East (Garcia-Ventura 2014). Did the Phoenicians, for instance, have male textile workers? And if they did, how did they adapt that practice to their new colonial settings? How was textile production organised in other Iberian and island regions?

Besides rethinking gender roles in textile production, there are many textile topics traditionally disregarded by scholars whose study would bring insightful perspectives to the study of the Bronze and Iron Ages in Portugal and Spain. I will highlight here only two of them: the manufacture of sails and textile creativity. There is a striking lack of studies (not of evidence) for the production of functional textiles such as sails in the Bronze and Iron Ages in Spain and Portugal, even though the Iberian Peninsula is always interpreted as the cultural crossroads between the Atlantic and the Mediterranean (Celestino Pérez *et al*. 2008), and was colonised by Phoenician, Greek, and Roman seafarers. Indeed, underwater archaeologists have excavated several Phoenician shipwrecks off the coast of Murcia in Spain (Martínez Alcalde *et al*. 2017; see also Gambin

et al. 2018; Pomey and Poveda 2015), some with remains of rigs and cords. Yet, there are no studies to date on sail production – the lack of preserved textiles should not prevent archaeologists to study them, as it does not the interpretation of many other archaeological absences.

Another neglected yet fascinating theme in Bronze and Iron Age Spain and Portugal is craft ingenuity (Bender Jørgensen *et al*. 2018; Romankiewicz 2018). Creativity in textiles served (and continues to do so today) visual and sensory purposes besides the practical ones. In Europe, creativity was boosted especially from the (Late) Bronze Age when most textile tools likely took form and wool was introduced as a fibre (Bender Jørgensen 2018a: 27; 2018b: 69). Spinners and weavers played with textures and the sense of touch, colour, reflections and lighting, glittering, shape and patterns (Fossøy 2018; Grömer 2016; 2018; Rösel-Mautendorfer 2018), including the decoration of their tools (Bergerbrant 2018; Berrocal-Rangel 2003: fig. 9; Gomes 2017: 49). Wool is particularly good for dyeing, and the process of dyeing has been in fact the most explored among archaeologists, especially for the production of shellfish-purple dye upon the arrival of the Phoenicians in Iberia, the Balearics and the Canary Islands (Aleixandre and Pastor 2008; Bernal Casasola *et al*. 2011; Marín-Aguilera *et al*. 2018; Mederos Martín and Escribano Cobo 2015; see also García Vargas in this volume). Nonetheless, mollusc-dye was not the most common one in the ancient Mediterranean, but rather plant dyes, which were easier and 'cheaper' to produce, as explained by Martínez García in this volume. Not surprisingly, shellfish-purple dye was imitated and widely consumed by the masses by the Hellenistic period, making it very difficult to tell the difference between the 'real' purple dye and the plant-based dye (Gleba *et al*. 2017).

CONCLUSION

Textile remains are scarcely preserved in Portugal and Spain, but textile tools are ubiquitous. Yet, textile studies continue to be overlooked by scholars. Future research lines to explore are varied. We need more scientific and methodological analyses to approach the study of Bronze and Iron Age archaeological textiles and tools, their production and consumption; but also, fresh and renewed insights into functionality, context, economic and trade impact, and creativity.

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