

Bronze Age Woollen Textile Production in England: A Consideration of Evidence and Potentials

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Responding to recent advances in knowledge about the first arrival of woollen sheep in Europe and linked investigations of textile remains on the Continent, this paper argues that our insight into the role of wool in the English Bronze Age needs rethinking. We argue that the relevant questions are: when did the procurement of and working with wool become a routine aspect of settlement life, and did the change from plant fibres to wool affect communities differently? The paper outlines some of the core research questions we need to consider and points to the necessity of triangulating between the evidence provided by textiles, faunal remains, and textile working tools to reach more comprehensive insights. The paper ends by indicating a further research question – namely whether the apparent differences in the ‘wool economy’ in different parts of Bronze Age Europe may suggest differences in ‘body politics’.

Keywords: England, Bronze Age, textile, fauna, sheep, spindle whorls, loom weights

In 1940, Grahame Clark (1940, 51) lamented our lack of knowledge of Bronze Age textile production in England, describing it as ‘pathetically ignorant’. Despite the vastly improved understanding of the English Bronze Age generally, this characterisation is sadly still largely valid in terms of widespread appreciation of the role of wool. Many of the examples of Bronze Age textiles that he was aware of, including the woollen fabric from Rylstone (for its re-dating see below), remain the go-to examples today, and little has been written about woollen textile production – when did it appear, what were its effects on social organisation, daily lives, or communities of practice? This stands in stark contrast to the wealth of discussion on bronze production, including its effects on social organisation (eg, Timberlake 2014; Carey *et al.* 2019), crafting practices (eg, Webley & Adams 2016; Webley *et al.* 2020), ritual action (eg, Jones & Quinnell 2013; Knight 2019), and long-distance connections (eg, Needham 2004; Williams & Le Carlier de Veslud 2019). There is a risk

that the preservation of bronze, and its use in our definition of the period lead us to over-emphasise its role in the economic changes that took place in England over the course of the Bronze Age. The conversation should be enlarged to include other innovations and developments that transformed economic practices, social structures, and the rhythms of life. We argue that we need to consider whether woollen textile was such an innovation and, if not, what does its late introduction, when compared with neighbouring regions, mean for our understanding of long-distance connections and the range of changes during the Bronze Age?

Discussions of Bronze Age woollen textile production are well-developed elsewhere in Europe and the Near East, incorporating insights gained from new scientific techniques (eg, Breniquet & Michel 2014; Sabatini & Bergerbrant 2020a). The resulting alterations to our understanding of the period have been striking (for discussion, see Kristiansen & Sørensen 2019), but these debates have not, as yet, fully affected research on the Bronze Age in England. In response, and to provoke further conversation, we have two broad aims in this paper: first, to argue that research into the Bronze Age exploitation of wool is not dependent on, and thus restricted to, the fortuitous preservation of the textiles themselves and that a

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wealth of useful information already exists, and secondly, to sketch-out the implications that such studies may have.

WOOL IN THE EUROPEAN BRONZE AGE

It has long been assumed that secondary products had a pivotal role in the cultural and social changes observed during later prehistory in Europe. Andrew Sherratt's 1981 article on 'the Secondary Products Revolution' turned this idea into an interpretative trope. Wool was emphasised as a secondary product of sheep, and sheep, in turn, tended to be equated with wool. Wool production and associated textiles and trade were assumed to have been integral to European societies since the 4th millennium BC. We now know this interpretation is not correct. Early domesticated sheep were not 'woolly', and their short hairy fleece was not suitable for spinning. Rather, wool emerged as a property of their domestication alongside reduced body size, longer tails, and horn changes resulting in hornless ewes. While wild sheep have a short, hairy outer coat and an even shorter, woolly undercoat, domestication and selective breeding caused the underwool to develop and the natural pigmented coat of wild sheep was replaced by lighter, ultimately white, wool. Annual moulting of the fleece was replaced by continuously growing wool (Ryder 1983, 45). These developments were gradual, not concurrent, and still await further study. However, this new material had many properties useful for the production of textiles, particularly its excellent insulating capacities, ability to absorb moisture before feeling wet, and remaining warm even when damp (Bender Jørgensen *et al.* 2018, 26–7).

A combination of archaeozoology, written sources in cuneiform and Linear B, and fibre analysis makes it possible to trace stages of the development of wool, and it is now generally agreed that woollen sheep first appeared in Europe during the Bronze Age. Smaller Neolithic sheep were replaced by larger animals with a more robust body shape around 4500–4000 BC in south-west Asia, reaching south-east Europe by 3000 BC (Becker *et al.* 2020, 88–90). This new type is presumed to have had a woollier coat (Becker *et al.* 2020, 90). Certainly, cuneiform texts from the first half of the 3rd millennium BC mention different wool qualities (Breniquet 2020, 20), while Minoan Linear B texts from later in the 3rd millennium describe flock compositions from Crete and Greece

with large numbers of males (Killen 2007, 51; Militello 2007). This is important because castrated males (termed wethers) produce more and better wool than other sheep.

Meanwhile, fibre analysis has demonstrated the changing character of the underwool and its gradual replacement of the coarse outer coat; in Central Europe, this is visible by 1100–1000 BC (Rast-Eicher 2008; Gleba 2012, 3648; Rast-Eicher & Bender Jørgensen 2013). It is likely that wool was still moulted annually during the Bronze Age, and thus that it was harvested by plucking or rooing, as the shears necessary to harvest continuously growing wool were not introduced until the Early Iron Age (Rast-Eicher 2018, 119). It is worth emphasising that this was far from a linear development, as is obvious from Pliny's description of the wool qualities available in the 1st century AD, some of which were still plucked (Pliny, *NH* viii lxxiii).

The evidence from textile remains themselves similarly suggests a Bronze Age date for wool production in Europe. The earliest evidence, so far, is the use of wool yarn in the decoration of a flax textile from the pile dwelling of Molina di Ledra in Trentino, Italy, dated to 2200–2100 BC (Bazzanella 2012). Other finds from the Czech Republic (1900–1800 BC, Štolcová & Březinová 2018), Switzerland (1891–1634 BC, Rast-Eicher 2015), and Denmark (1700–1500 BC, Bender Jørgensen & Rast-Eicher 2016) attest that woollen textiles were widespread in Europe by 1600 BC. From early in the 2nd millennium onwards, production and trade in wool, yarn, and woollen textiles were major aspects of the Bronze Age economy in Europe (eg, Gillis & Nosch 2007; Gleba & Mannering 2012; Kristiansen & Sørensen 2019; Sabatini & Bergerbrant 2020b).

This raises important questions about the timing of wool acquisition in England and, consequently, connections to the European mainland. The production of woollen textiles makes considerable demands on small-scale communities, representing a range of interconnected activities, community choices, and investments (Bender Jørgensen *et al.* 2018, 67–73). The adaptors and skills which came with domestication (see Serjeantson 2011, 92f) must now be more carefully spread out over time. Practical impacts may include altered labour divisions, the need for substantially more animals than before, and the development of specialisation. Keeping large flocks of sheep would have affected landscapes and Serjeantson (2011, 100) suggests that, by the Late Bronze Age, sheep rearing for wool had 'important

implications for the transition of the landscape in southern Britain from one which was largely wooden to one with grassland which was maintained by the relentless grazing of sheep'. Rearing sheep for wool would also have had more ephemeral impacts, such as on human–animal relationships; as most of the animals in the flock were invested in and kept for years, distinct practices of flock management must have developed. Dogs for shepherding may have been drawn into this assemblage although this is difficult to prove empirically as 'highly specialized sheep herding is a behavioural trait' leaving no osteological trace (László Bartosiewicz pers. comm.). Moreover, wearing woollen textiles would mark individuals out, as the textiles look distinct from those made of plant fibres and drape differently on the body (Sørensen 1997; Harris 2012). Such differences in appearances, moreover, would resonate with wider differences in what objects were made for the body, suggesting that textiles were partners to the materialisation of social groups and a means of manifesting social differences. In turn, regional differences within this 'vocabulary' would have been an important social visualiser. There were also substantial economic impacts and potentials, and barter, trade, or gifting of different stages of processed wool may have been considerable. Isotopic analyses of some Danish Bronze Age textiles suggest that wool, yarn, and finished textiles may have moved over large distances (Frei *et al.* 2017).

The labour investment represented by woollen fabrics is substantial. From managing mating for propitious lambing and managing grazing sites and winter fodder to recognising when wool was ripe for plucking, and how to sort, wash, and process it, the tasks that precede spinning were substantial. Andersson Strand and Cybulska (2013) argue from neo-Sumerian texts that a 3.5 × 3.5 m fabric of average quality would use the wool from four sheep and have taken some 124 working days to produce. They further argue that the spinning of the necessary warp- and weft-thread would take up the work of one person for 67 days. If we use these data and assume that the Rylstone textile measured *c.* 2.10 × 1.30 m (similar to the size of the blanket from Muldbjerg, Denmark, which served a similar role; Broholm & Hald 1940) then, based on the number of warp- and weft-threads per cm of the Rylstone fabric, 4300 m of yarn was required to produce it. Experiments have shown that an experienced spinner can produce on average 35–50 m of yarn per hour and a weaver insert 24–26 wefts per hour (Bender Jørgensen *et al.* 2018, 72). At 40 m/hour, the yarns

for the Rylstone textile would take *c.* 107 hours to spin and, at 25 wefts/hour, about 70 hours to weave, using the wool of one or two sheep. To this should be added time to harvest, clean, and sort the wool before spinning, and for finishing the web after taking it from the loom. Moreover, if these tasks were interspersed with other domestic tasks and subsistence activities then a textile like this probably took several months to produce. These figures serve to make the point that this was no mere domestic chore but a significant part of productive life in these communities, with a large potential to influence the organisation of social life.

From this overview, two points are clear: first, that wool production is far more labour intensive than keeping sheep for meat only and, second, that this may have resulted in societal changes such as a tendency to up-scale activities among those aiming to produce wool beyond their own need. Until recently, this element of the Bronze Age story was not well known, and the societal implications of wool and textile production could not be compared to metallurgy; they can now, at least in some regions. However, this debate has had little impact upon the English Bronze Age and comparisons with mainland Europe are sparse. A firm starting point, though, is the recent redating of the Rylstone log-coffin. Previously thought to be the earliest woollen textile from England, it has been dated to 840–590 BC (and the coffin to 910–760 BC) (Melton *et al.* 2016). This clearly challenges any assumption that wool was an integral part of the British Bronze Age economy from the Early Bronze Age onwards and demonstrates the paucity of our current knowledge.

EVIDENCE FOR BRONZE AGE TEXTILE PRODUCTION IN ENGLAND

Clearly, a complete treatment of this topic requires a thorough and critical integrated review of several different strands of evidence, as well as new data on sheep. This paper cannot offer such an account, instead our aim is to argue for the importance of this aspect of Bronze Age societies, to overview available evidence, and to inspire further research in this area. We focus specifically on England because of possible chronological differences between England and Scotland in the appearance of wool (see below) and the different character of landscape use between England and other parts of Britain. This geographical area is, of course, arbitrary for the Bronze Age, but

reflects the fact that the majority of sites we discuss have been found in southern and central England in the context of developer-funded excavation. Our current knowledge, even in the form of overviews (eg, Hambleton 2008; Serjeantson 2011), is fragmentary, and it is no simple matter to rectify this. A recent estimation put the number of Middle Bronze Age settlement sites from Britain at *c.* 8000 (Caswell & Roberts 2018, 343), though records are uneven, and a central register is lacking. Further challenges are presented by poor preservation, regional surveys, and databases of varying qualities and coverage, developer-funded archaeology favouring some regions over others, and the scattering of reports in ‘grey literature’ or awaiting full post-excavation publication.

As Rylstone demonstrates, woollen textiles were in use in England by the end of the Bronze Age, and they are well attested during the Iron Age. However, there has been little attempt to ‘trace back’ Iron Age woollen textiles through arguments about the development of the craft, and little discussion of the possible connections between Iron Age technological habitus and Bronze Age regional craft traditions. Indeed, it is more common to note the differences than the similarities between the Bronze and the Iron Age: the change from cylindrical loom weights to triangular ones, the change from tabby weave to twills, etc. (Lewis Ferrero pers. comm.). Moreover, whereas provenance studies are a routine part of our analyses of other materials, such as flint, pottery, or metal, we have tended to assume that Bronze Age textiles were local products, but this assumption has now been challenged on the Continent through isotopic studies.

Beyond textile remains, Bronze Age settlement sites often contain evidence for the production of textiles (spindle whorls and loom weights and proxies in the form of faunal remains). The possibility of differentiating fibre types based on textile tools has been extensively discussed (eg, Barber 1991; Grömer 2016; see papers in Sabatini & Bergerbrant 2020a), but no consensus has yet been reached. Textile tools, therefore, do not in themselves provide evidence for the production of wool rather than plant fibres and textiles. However, research into the effect of the shape and weight of spindle whorls and loom weights on the final products has made substantial advances, and according to Andersson Strand and Nosch (2019) it is possible to use these variables to discuss the quality of intended outcomes, including the degree of

standardisation, and thus provide insights into the organisation of the craft.

Faunal remains may also hint at wool production in particular locations, as the characteristic signature of large numbers of adult males is possible to recognise. The flock compositions from some Late Bronze Age sites in southern England suggest wool production (Serjeantson 2007), though this is not a widespread trend (Hambleton 2008) and more work is required to clarify the picture. Similarly, sheep grazing may leave a signature on the landscape, but this has not been clearly recognised (see Serjeantson 2007). However, substantial alterations to land organisation during the second half of the 2nd millennium BC might be considered through this lens (see Yates 2007).

WOOL PRODUCTION DURING THE ENGLISH BRONZE AGE – A PRELIMINARY OUTLINE

For the remainder of this paper, we consider these multiple strands of evidence to illustrate the potentials that exist, their limitations, and the possible implications for our understanding of the period. As this paper aims to stress the need for more research this is not the place for a systematic account of data, and the following observations are not based on the extensive engagement with grey literature that the topic demands; such a project would need substantial investment. Rather it emerges from engagement with publications of well-known sites supplemented by insights gleaned from some grey literature. Nonetheless, important issues for future research become evident.

Although a focus on origins can be reductive (Crellin 2020, 10–13), one of the principal questions here concerns the coming of wool technology to England – not because this suggests that a wool economy was then ‘settled’ and unchanging, but rather because this informs us about changes at the level of productive activities as well as about contact and relations with other European societies.

Textile evidence

Early research on prehistoric textiles in Britain assumed that Bronze Age textiles were made of both wool and plant fibres throughout the period. There were three reasons for this: first, pieces of textile from burials that were thought to date to the Early Bronze Age; secondly, it was not known that sheep with a woollen coat did not appear in Europe until the 2nd

millennium BC, as discussed above; and thirdly, methods for fibre analysis were in their infancy.

Audrey Henshall (1950) offered one of the first overviews. The evidence listed included textiles made of different fibres and indirect evidence in the form of textile-working tools and impressions in the patina of bronzes. John Hedges (1973) added substantially to this in his, unfortunately unpublished, MA thesis, and individual finds from Rylstone, Shrewton, and Weasenham Lyngs were investigated by Elisabeth Crowfoot (Harris 2019, 184–7). Bender Jørgensen (1992), in her volume on North European textiles, recatalogued the material and added a few new pieces. Additions since then have all been plant textiles. Susanna Harris's (2019, 174–91) catalogue of Bronze Age textiles from Britain is the most up-to-date overview, and her broader work has significantly advanced our understanding of British Bronze Age textiles (eg, Harris 2015; 2016; 2019). Some of her key contributions have been a greater awareness of the variety of fibres used, such as nettle and flax, and procedures seen, for example, in methods of fibre preparation (Gleba & Harris 2019). This makes it possible to reflect on similarities and differences between regions including different parts of Europe. This research has led to a better understanding of the degree of sophistication of (Late) Bronze Age plant textile technology, including forthcoming analyses of the various production stages and finished textiles at Must Farm, Cambridgeshire. However, we are still left with fundamental questions concerning the timing of the appearance of woollen textiles and their socio-economic, temporal, and geographical characteristics.

Of the candidates for Early Bronze Age wool textiles mentioned by Henshall (1950), only that from Rylstone survives but is now dated to the Late Bronze Age/Early Iron Age transition. Other finds noted by Henshall need not be completely absent from the discussion, however. Delicate remains were frequently lost during early excavations, but some record remains. For instance, the excavation of an urn at Winterslow, Wiltshire, was recorded thus: 'When the urn was removed, the cremation was seen to have been wrapped in linen which had the appearance of a veil of fine lace of mahogany colour. Unfortunately, it crumbled to dust and the wind blew it away' (Stevens & Stone 1939, 177). Similarly, W. Cunnington, excavating Durrington Grave 69 in 1803, vividly reported that 'On taking it [the urn] up we discovered a considerable quantity of decayed linen cloth (and some pieces I conceived to be woollen), but although we could see enough to remark

on the coarseness and thinness of the texture, it could not bear exposure to the rough wind we had that day' (Cunnington 1884, 261). In this case, Cunnington made a distinction between linen and wool textiles. Unfortunately, we have no means of verifying his observation, but it is worth keeping in mind that at the time people were much more familiar with textiles in natural fibres and of differences in how they looked than we are. We may suppose that Cunnington did not randomly identify something as woollen. There are, thus, some hints that woollen textiles may have been present before the Late Bronze Age, and indeed textiles often played an important role in Bronze Age burials: the deceased was presented clothed. Textiles (plant) in the form of wrappings of pyre remains were even used in some cremation burials (Harris 2019). In this way, textiles appear to have played an important role in defining and reinforcing identities at the graveside (Haughton 2018). Textile imprints on clay, such as on one of the Beaker pots from Ringlemere (Parfitt & Needham 2020) lend further support to arguments that textiles (made of different fibres) were common during the Bronze Age. However, at present there are not any obvious candidates for much earlier dated *woollen* textiles from England than Rylstone, although systematic review of remains attached to bronze objects or imprinted on pottery may push this date back slightly.

Textile quality may also hint at chronology, by marking the development of the craft. Late Bronze Age woollen textile evidence from England generally reveals a rather undeveloped craft with most fragments being simple tabby weave (one under, one over) and made from Z-spun yarn. The density of the Rylstone textile is described as uneven (Melton *et al.* 2016, 4). On such evidence we may suggest that in general the woollen textile fragments from England reveal a relatively simple and rough production with 'coarse loose texture' (Greenwell 1865, 254). Interestingly, the excavator's description of the Rylstone textile prior to it being removed from the coffin suggests that this was originally a large piece that reached from head to foot of the deceased (Melton *et al.* 2016, 3). The production of large textiles does require some skill, time, and also access to considerable amounts of processed wool, so unless the piece was sewn together from strips this suggests that such were available.

Other fibres were used during the Bronze Age, with examples of complex weaves in plant fibres (Melton

et al. 2016, 4; Harris & Jones 2017) and hair braids (Sheridan *et al.* 2016). The high technical – and artistic – quality of the nettle textile from the Early Bronze Age (1690–1620 BC) cremation burial at Whitehorse Hill, Devon is striking in this context (Harris & Jones 2017). It is described as beautiful and its technical execution, when using a European-wide scale (relative fineness of its balanced tabby), is given as fine to very fine (Harris & Jones 2017, 24). According to Harris, the majority of the 23 balanced tabby textiles made of plant fibre known from Britain falls in the fine or very fine category (Harris 2019, fig. 7.6). It is noteworthy that some of the finest textiles from Denmark are similarly made from plant fibres and in one instance horse hairs, and the quality of the well-known Early Bronze Age (Period II–III) pieces of woollen clothing are, with a few exceptions, relatively simple and coarse (Bender Jørgensen 1986, 290; Mannering *et al.* 2012, 96–7; Fossøy 2018). In contrast, high-quality woollen textiles, for example made in twills, are found in the Alpine area already from the Bronze Age (Grömer & Saliari 2018, 139–40).

Interestingly, there seem to be more, and potentially slightly earlier, wool textiles from neighbouring Scotland and Ireland (for overviews see ScARF [nd](#); Wincott Heckett 2012). Whether this is due to differences in preservation or reflects a Bronze Age reality is currently unclear. Organic remains in a cist burial from Keas Cottage, Spinningdale, Scotland, were identified by Penelope Walton Rogers as wool or part of a sheepskin (Arabaolaza *et al.* 2013, 15; Melton *et al.* 2016, 4). With a date of 2051–1911 BC for the human remains (and 2151–2018 BC for charcoal from the burial) this is surprisingly early. The characteristics of the fibre correspond well with established characteristics of Bronze Age wool (Arabaolaza *et al.* 2013, 13). It might indicate an early mutation towards wool in Scottish herds or, alternatively, may have been an import. However, early pieces are also known from Sheshader, on the Isle of Lewis, where a wool cord dates to 1300–840 BC, as part of a complex organic pad made from a combination of fibres and textile crafts: plaiting, twisting, cording, and felting (Ryder 1999; ScARF [nd](#)). Woollen textile fragments were also found attached to bronze items in a hoard from Carnoustie, Angus, dated to 1120–920 BC (Spence 2017). These fragments were of two textiles, one coarsely and the other finely woven. This suggests that a diverse range of textiles were available in Scotland, and that there was also a degree of skill (and thus experience). Such skills may be used as a proxy for

how established a craft is: a finely woven textile is presumably not the first of its kind.

Faunal record

Sheep have been present in England since the Early Neolithic, though their numbers were low prior to the Bronze Age. A dramatic increase in the Early Bronze Age saw sheep making up to 40–60% of the NISP (number of identified specimens) at sites surveyed in southern Britain by Serjeantson (2011, 18). A word of caution must be given here, as the majority of sites were round barrows rather than domestic sites and, therefore, may not represent normal daily activities. By the later Bronze Age and into the Iron Age, however, there is clear evidence for sheep being the most populous animal on many domestic sites in southern Britain (Hambleton 2008, 39). Serjeantson (2011, 29) considers it likely that an improved fleece (ie wool) was the prime motivator for increased sheep numbers, but points out that this is not certain as sheep skin is also very good for clothing, and sheep manure is better for agriculture than other domestic alternatives (Serjeantson 2011, 30). Furthermore, small-scale activities aimed at the production of wool could easily be integrated with a mixed subsistence strategy resulting in most settlements having a few sheep.

It is not yet known whether these early sheep were native breeds and if not when and from where new breeds appeared, and particularly what the origin was of the woollen sheep. However, by the Iron Age, sheep were of a very consistent size (Maltby 1981, 189) which may hint that similar breeds were favoured. Preliminary investigations suggest this was also true for the Middle and Late Bronze Age, but the lack of a standard methodology for reporting animal size severely restricts comparisons (Hambleton 2008, 48–9). This will be a critical question for furthering understanding of the development of wool production in England, as will regional differences which are currently very difficult to assess owing to the disproportionate focus on southern England in the published data.

Most commonly, excavation reports provide data on flock composition (age and sex ratio). This can provide some of our most grounded evidence of communities' engagement with wool production, or other products of sheep. Historic England's 'The Sheep Project' provides a baseline of the types of flock indicative of large-scale wool production and flock management in later periods, generally characterised by a high

proportion of adults, particularly wethers (eg, Popkin *et al.* 2012; Worley *et al.* 2016). Indeed, it is widely held that the sex and age ratio of a flock may be critical for recognising wool production (eg, Becker *et al.* 2020) and the presence of wethers is taken as a key indicator, as they produce the finest wool and are less aggressive and easier to manage than rams. Wethers are rarely identified in zooarchaeological reports, though experience from Denmark shows that this is possible (eg, Hatting 1983). However, due to the fragmented and partial nature of the animal remains generally recovered it is frequently difficult to establish the sex profile of the sheep population. Taphonomic and cultural factors affecting the survival of this evidence must be carefully considered on a case-by-case basis. For instance, sheep may naturally die away from settlements and cultural practices linked to consumption, such as feasting or the avoidance of particular foods, can significantly bias their appearance within the archaeological record. While the sex ratio of flocks has a large potential to inform us of wool production, both the factors affecting this evidence, taphonomic and otherwise, and comparisons between regions and time periods, remain to be fully explored.

More common is the presentation of age ratios for sheep and this can be particularly useful in identifying sites where sheep were kept primarily for meat production. Iron Age assemblages show a fairly consistent mortality profile of less than 1-year-old and more than 3-year-old animals (eg, Cussans 2013), which is not optimal for meat production (Maltby 1996, 22; Hambleton 2008, 54). For the small number of seven Middle/Late Bronze Age sites, which Hambleton (2008) considered, the same pattern was not found as no particular age profile characterised all sites. Surveying nine large assemblages spanning the Middle Bronze Age–Early Iron Age in southern England, Serjeantson (2007) found that, although sheep were often kept in large numbers, there was no evidence from the culling patterns that wool was the primary motivator of flock management. However, this does not, of course, preclude small-scale wool acquisition occurring alongside milk and meat production.

A few later Bronze Age sites have, however, provided age profiles which offer hints of herd management. At Downsvew, Brighton, a Middle/Late Bronze Age settlement site, cattle bone was found to represent all elements of the animal, while only meat-bearing elements of sheep were present (Stevens 2002, 189). The sheep had generally been

killed at an age of *c.* 36 months, further suggesting they were reared for meat (Stevens 2002, 191). At East Chisenbury, Wiltshire, there was a high kill-off of lambs, and an under representation of older sheep, suggesting a primary interest in meat production (Wessex Archaeology 2017, 17–8). Meat was also hinted as the purpose of sheep keeping at Brean Down, Somerset, where sheep were predominantly killed when they were newly mature, suggesting that meat production was not particularly specialised (Hambleton 2008, 55). The latest phase of excavation at Black Patch, East Sussex, suggested that sheep were killed at *c.* 20 months (Green 2011), though as this was based on just four teeth care should be taken with this interpretation.

However, not all Bronze Age sites suggest sheep were primarily kept for meat. By contrast, the majority of sheep at Patcham Fawcett A, a Middle/Late Bronze Age site near Brighton, were mature individuals (Wood 1993), and this was similarly the case at the neighbouring Middle Bronze Age site of Patcham Fawcett B (Tapper 2011), where the majority of sheep were estimated to be over three and a half years. Such a mortality profile strongly suggests that sheep were kept for secondary products – be that milk, wool, or both. Harder to interpret is the mortality profile from the Late Bronze Age site at Potterne, Wiltshire, which suggests an annual autumn cull amongst all age groups (Locker 2000, 115). This hints at a practice of managing herd size in the face of advancing winter but is not a kill pattern which optimises either meat or secondary product procurement, and thus may evidence a mixed focus, or it may be a result of the special character of this site. At Fengate, Cambridgeshire, most of the identified sheep remains were from adults (Harman 1978; Biddick 1980). Although preservation issues may have impacted this ratio (Harman 1978), it suggests that secondary products were of prime importance for this flock.

Pryor's (1996) provocative imagining of the landscape at Fengate remains a rare example of an attempt to look at how fundamentally these herds would have affected the rhythms of life, with the construction of the landscape largely affected by the flock, and gatherings of humans taking place in the context of flock management, movement, and interaction. His interpretation, has, however, subsequently been critiqued both as regards the proposed use of the field system and due to the relatively small ratio of sheep bones (Evans 2009, 243ff), and Fengate was probably

not focused on the rearing of sheep for wool. But some sites, such as Patchem Fawcett A and B may have related to intensively managed wool flocks and in turn they suggest substantial changes on the community level.

A proxy for sheep rearing may be the effects on the landscape as their grazing takes a particular form. As sheep are highly sociable, they move together while grazing and their cleft upper lip causes close grazing. In principle, an area grazed by sheep rather than cattle would leave a different mark upon the landscape. It is, however, not at all obvious that grazing during the Bronze Age would be so intensive that it could show up in the environmental record. Soil micromorphological samples have at times identified sheep/goat dung in thin section (Charly French pers. comm.), but this does not in itself provide insights into the size of flocks.

Taken together, this brief overview of flock composition at some of the most well-known sites suggests that inter-site differences may exist which reflect different approaches to sheep management and product procurement in the Bronze Age. Beyond this, it is difficult to discern regional trends here given the discrepancy in excavation rates. However, the growing number of sheep remains from later Bronze Age sites seems to suggest that the animal took on an increased importance at this time. Further study is needed to assess how much this was impacted by an interest in wool production.

Technological know-how, production characteristics

Textile tools are important evidence, partly because they are generally not affected by the same preservation issues as textiles and faunal remains, and partly because they provide evidence of how the craft was exercised. Yet for a number of reasons they are also tenuous proxies for wool textile production. First, as previously noted, they can be used for different kinds of fibres and thus evidence textile production rather than wool. Secondly, textile tools from the Bronze Age are found as part of refuse, and often show considerable detrition and abrasion suggesting they have been moved around and thus do not provide evidence for the spatial arrangement of textile activities. Although a loom needs a number of loom weights, it is common to find just a single or a few fragments of loom weights on most sites.¹ Thirdly, many loom types do not use loom weights, and spindles do not need spindle whorls to function; these tools, therefore reflect particular ways of performing

these stages of textile work rather than being necessary elements of textile production.

Despite a lack of syntheses, regional differences in textile tools have been proposed. Barford and Major (1992) observed that loom weights came from sites on light soil in south-eastern England, though they acknowledged that this could reflect the focus of developer-funded excavations. Bradley (2007, 193) stressed the absence of textile tools from some areas, such as the downland of southern Wessex, and suggested that some settlements had adopted specialisms at this time. It is noteworthy that although the textile evidence from Scotland and Ireland appears richer, settlement sites there have spindle whorls but hardly any loom weights (Wincott Hockett 2012), while the opposite appears to be the case for many regions of southern England, such as Kent (Champion 2011). Pursuing this question should be on future research agendas.

Loom weights: Although rare before the Middle Bronze Age, loom weights are subsequently relatively common in England. The Middle Bronze Age weights were generally cylindrical, with pyramidal versions appearing with the Late Bronze Age, and triangular designs characterising the Iron Age (Barford & Major 1992; see Fig. 1). This sequence is evidenced stratigraphically at multi-period sites such as Mucking, Essex, and has been proposed for the Middle Thames Valley, with the change seemingly occurring around the 9th and 8th centuries BC. Therefore, for most of the Bronze Age cylindrical weights were used and there was little difference in shape, either regionally or temporally. This similarity in production tools could suggest contact between craftspeople – an extended community of practice. It has been suggested that the development of the pyramidal shape may have been concentrated in the south-east (Barford & Major 1992, 118; Brown & Medlycott 2013, 125), though they have also been found elsewhere, including in the south-west (Webster 2008). The reasons for the change in shape are unclear, but the shape of loom weights has little influence on the textile produced. Rather, it is weight and thickness which affected the final product (Andersson Strand & Nosch 2019, 20). Thus, the change in shape was likely due to fashion or trends, potentially including influences from mainland Europe, for the triangular Early Iron Age loom weights are similar to those found elsewhere in Europe (Webley 2015).

Bronze Age loom weights are varied in size and fabrics. They generally weigh *c.* 1 kg, but with some

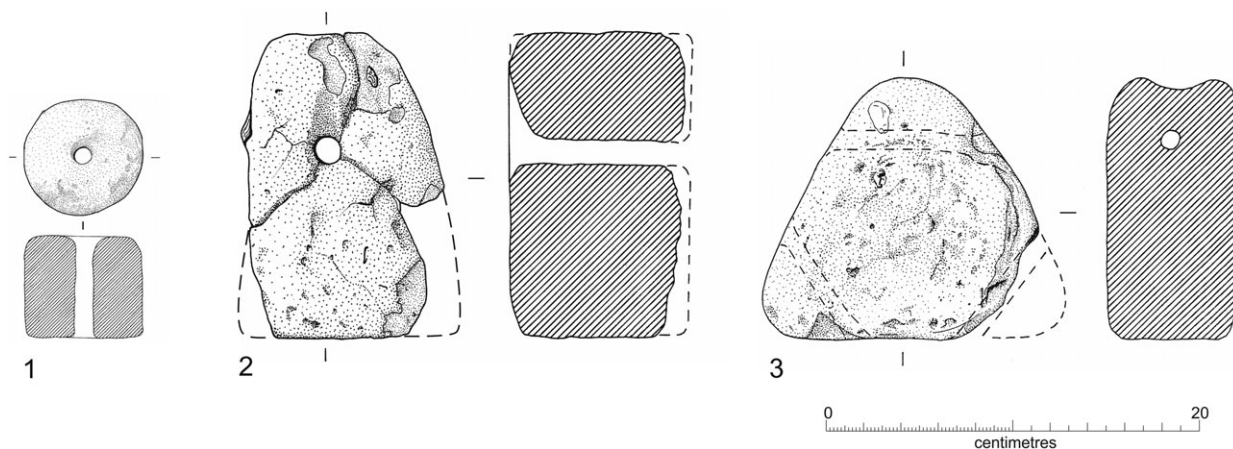


Fig. 1.

Examples of (from left to right) a cylindrical, pyramidal, and triangular loom weight, all from Mucking, Essex (redrawn by A. Hall)

examples weighing up to 3 kg (Barford & Major 1992, 117). Consistency of weight may be used to estimate the quality of textile produced (Andersson Strand & Nosch 2019) but the fragmentary nature of most Bronze Age loom weights and the lack of a systematic dataset make comparisons difficult and we cannot yet establish whether variations indicate different production techniques or different products nor whether there were degrees of standardisation or specialisation. Similarly, little attention has so far been given to fabric variation, although it is routinely described in grey literature. Their fabrics are usually coarse and made of roughly tempered, locally available clay. Such variation may illuminate how they were produced, and when compared with local pottery and other pieces of burned clay (such as daub), can be avenues for discussing what the fragmented weights represent. It is, for instance, reasonable to assume that sets of loom weights were produced together and therefore had a certain consistency in terms of fabric, so when fragments from weights made of very different fabrics are found in middens or ditch fills then, as we do with pottery, we might be able to tentatively suggest whether these were the weights from one or several looms.

The distribution of loom weights is heavily influenced by the locations of developer-funded projects and by the interests of individuals (eg, Andy and Pat Chapman [2014] working in Buckinghamshire and Lincolnshire and Paul Barford's [2016a; 2016b] work in the south-east). As noted, loom weights may have been absent from some areas prior to the Iron Age,

such as on the Wessex chalk (Bradley *et al.* 1980, 288), while for other areas loom weights are common on Middle/Late Bronze Age sites, and for other regions we could find no statements. Overall, it seems agreed that loom weights are present, albeit usually in small numbers and in fragments, in most areas of southern England. This includes several (but not all) Middle/Late Bronze Age sites on the South Downs, such as Black Patch and Itford Hill (for a discussion of the major settlements in the South Downs, see Tapper 2011), numerous sites on the Berkshire gravels (Bradley *et al.* 1980, 288), and other sites throughout central southern England, such as Springfield Lyons and Mucking in Essex (Brown & Medlycott 2013, 125; Barford 2016a). Recent developer-funded excavations in the East Midlands have expanded the record, and loom weights appear to be commonly found on Middle Bronze Age settlements and related ditched field systems in Lincolnshire, particularly along the northern fen edge, such as the fragments of 19 weights from Manor Pit, Baston (Chapman 2020). Without dedicated research, however, it is difficult to discern the distribution of loom weights in England, and there is a worrisome gap in the West Midlands and northern England. So far, the 11 cylindrical loom weights from Billingborough, Lincolnshire (Chowne *et al.* 2001), is the most northerly substantial find of loom weights in England of which we are aware.

While fragments of more than one weight are common, it remains rare to find several together, especially

within one feature, although the record has been growing in recent years. This makes the 13 weights found together at South Ockendon, Essex, from an apparent Middle Bronze Age context (Doyle 1967), the aforementioned 19 whole and fragmented weights from Manor Pit, and the 20 or so weights that Fox (1928) extracted from a pit in Hampshire significant. One of the most interesting assemblages is the ten cylindrical weights from a presumed Middle Bronze Age pit at Magna Park, Milton Keynes, Buckinghamshire (Chapman & Chapman 2014). The weights of these loom weights fall in two groups and seven are decorated (see Fig. 2). The excavators suggest that ‘As a group, they might have formed a set from a single loom, with the decorated examples consistently weighing slightly less than 1.0 kg while the two heavier plain weights were perhaps used at either end of the loom’ (Chapman & Chapman 2014, 10). Apart from Andy Chapman’s (2012) article on the Magna Park finds, decorated weights have been given little attention but there are, in fact, several examples.

Bronze Age loom weights are usually found in pits, post-holes, and in the fills of various ditches. The instances where *in situ* evidence of weaving can be argued are, therefore, rare. One of the few examples is the Late Bronze Age enclosure at Itford Hill, Sussex, where J.V.S. Megaw and D.D.A. Simpson (1979, 256) and later Ann Ellison (1987) have argued for the presence of a ‘weaving hut’. Based on Middle Bronze Age sites from Sussex, Ellison developed a model of settlements composed of enclosures with a few different building types in use together; one acting as the main dwelling and the others as subsidiary structures and storage buildings. Activities such as textile work were assigned to the main dwelling and based on the range of finds in the site studied, it was proposed that more than half of the structures had been associated with textile production (Ellison 1981; 1987). The model, strongly influenced by the use of ethnography in the late 1970s as well as structuralism, may now be critiqued (see for example Bradley *et al.* 1980, 255f), but it has not been replaced, and we have little idea of how textile work was organised within settlements.

Spindle whorls: The number of spindle whorls dated to the Bronze Age in England seems surprisingly low; and they are generally much less common than loom weights, for example in the south-east (Champion 2011, 28). This may be because they were

made of organic materials. However, there are also interesting patterns in their apparent distribution as it does not overlap precisely with loom weights. Some sites have both, for example the Late Bronze Age site of Aldermaston, Berkshire (Bradley *et al.* 1980, 244), but others have only either loom weights or spindle whorls. This could suggest labour division between sites but, although this is a tantalising idea, we clearly need a comprehensive review of the data before this can be stated securely.

Bronze Age spindle whorls are generally of a biconical shape but can also be hemispherical or flattened globular. Secondary use of pottery sherds as spindle whorls (by drilling a hole through the centre), common on some continental Bronze Age sites, such as Százhalombatta-Földvár, Hungary (Vicze & Sørensen *forthcoming*) has not been clearly identified. The whorls are made of fired clay, usually of a fabric similar to local pottery, and there are a few examples with slight decoration.

Recent textile research has demonstrated that the weight and shape of spindle whorls directly affect the diameter of the thread (eg, Andersson Strand & Nosch 2019, 17); this therefore means that variation amongst spindle whorls reflects the production of different kinds of thread. This also suggests that such variation could be deliberately used to produce different types of fabrics, as well as standardisations. Variation may also be suggestive of the degree of connectedness between people involved in textile making across regions, as communities of practice share knowledge and skill acquisition. One example of this comes from Mucking, where the 15 Bronze Age spindle whorls fall into two size groups, one of *c.* 25 g, the other of 40 g (Barford 2016b, 196). This may indicate that at least two different kinds of yarn were being produced.

Future systematic analyses of Bronze Age textile tools, especially loom weights and spindle whorls, would help to clarify questions about standardisation of the tools themselves and through that of the textiles they were used to produce. This in turn would provide important data on the organisation of textile production (plant- and wool-based), which together with evidence from faunal remains and the textiles themselves, could provide a more nuanced discussion of how textile production developed in England, including glimpses of differentiation between settlements, as well as between regions.



Fig. 2.

Five of the decorated loom weights from the Middle Bronze Age site of Magna Park, Buckinghamshire (reproduced with kind permission from Andy Chapman)

CONCLUDING REFLECTIONS

To expand our insights into these fundamental aspects of the English Bronze Age we do need new data: aDNA to identify early woollen sheep; osteological analysis and other methods to understand flock compositions; isotopic analyses to investigate animal and textile movements – as well as a return to existing settlement data, to that hidden in our grey literature. The latter can be used to establish where sheep were kept primarily for meat or milk, and where new techniques for wool production were introduced.

Even this cursory review of the evidence already demonstrates that textile production was slowly becoming a major activity in many communities from the Middle Bronze Age. The similarity in textile tools across southern England at this time is also striking. This may suggest a degree of transmitted technological expertise, or know-how, between communities. Equally important, however, is the recognition that not all sites and regions were involved in these practices, raising important questions about differentiation between communities. Nor does it seem that sites involved in wool production were necessarily also involved in further stages of textile work. The hint that such differentiation may even exist between stages of textile production (spinning versus weaving) is tantalising, but as yet unconfirmed. Whether these tools

represent woollen textile production is still unknown, though the composition of some flocks suggests that wool may have been produced by some settlements at an earlier date than the earliest known wool textile from England.

A critical question emerging from this overview is the relationship between England and mainland Europe. The start of the Middle Bronze Age (c. 1600–1400 BC) has often been considered a period of substantial social change, with one driver probably being the expansion and redirection of long-distance exchange networks focused on metal. It is at this time that the Great Orme copper mine in Wales seems to have switched to more centralised organisation, with trade intensified across England and on to continental Europe (Williams *et al.* 2019). These contacts and associated mobility must have given rise to stories of other communities – rumours were shared about other people, and these would probably have included recounting how they looked and dressed differently ('different textile cultures', see for example, Sørensen 2014; Harris 2015; Gleba 2017). However, influences from continental Europe are not easy to identify in England at this time. Only in the 1st millennium BC, and especially after 900 BC, can we clearly argue for continental contact and influences for some regions. This is, for example, arguably the case for pottery

(Barrett 1980), although there was seemingly no influence on domestic architecture or settlement layout. We have to wonder about the one-sided nature of this interaction; were communities deliberately selecting against the adoption of fashions and trends that they would have encountered on the continent, or were metal trading networks less direct, and influences therefore far more diffused, than we have tended to imagine? Why did the metal trading network not result in influences on other technologies and fashion? Looking wider into the material culture of the different regions of north-western Europe, it appears that the continental Bronze Age body – dressed and adorned – was not ‘imported’ to England (Sørensen 2010). The differences in the wool economy in different parts of Bronze Age Europe may, therefore, not solely be about variations in subsistence practices and technological know-how but may also suggest differences in ‘body politics’, or in other words how Bronze Age communities regulated the human body.

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NOTE

¹ On most sites individual vessels are similarly usually presented by just one or a few sherds, though it is worth noting that many Iron Age sites have large numbers of textile tools, a numerical difference that goes beyond questions of preservation.

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RÉSUMÉ

Production de tissu de laine à l'âge du Bronze en Angleterre: étude de témoignage et de potentiel, de Mark Haughton, Marie Louise Stig Sørensen, et Lise Bender Jørgensen

En réponse à de récentes avancées dans notre connaissance de la première arrivée des moutons à laine en Europe et des investigations qui y sont reliées de vestiges de textiles sur le continent, cet article argumente que notre connaissance du rôle de la laine dans l'âge du bronze anglais a besoin d'être repensée. Nous argumentons que les questions appropriées sont: quand l'achat et le travail de la laine sont-ils devenus un aspect routinier de la vie de l'occupation et est-ce que le passage des fibres végétales à la laine a eu des effets divers sur les communautés. L'article souligne certaines des questions fondamentales que nous avons besoin d'examiner et indique la nécessité d'une triangulation entre les témoignages fournis par les textiles, restes de faune et outils pour le travail du textile pour arriver à une compréhension plus complète. L'article se termine en indiquant une

question de recherche supplémentaire, à savoir si les différences qui apparaissent dans l'économie de la laine dans diverses parties d'Europe de l'âge du Bronze pouvaient indiquer des différences dans les milieux politiques.

ZUSAMMENFASSUNG

Bronzezeitliche Produktion von Wolltextilien in England: Eine Betrachtung von Belegen und Möglichkeiten, von Mark Haughton, Marie Louise Stig Sørensen, und Lise Bender Jørgensen

Als Reaktion auf die jüngsten Fortschritte in unserem Wissen über die erste Ankunft von Wollschafen in Europa und die damit verbundenen Untersuchungen von textilen Überresten auf dem Kontinent argumentiert dieser Aufsatz, dass unser Verständnis der Rolle von Wolle in der englischen Bronzezeit überdacht werden muss. Wir argumentieren, dass die relevanten Fragen lauten: Wann wurde die Beschaffung und die Bearbeitung von Wolle zu einem Routineaspekt des Siedlungslebens? Hatte der Wechsel von Pflanzenfasern zu Wolle unterschiedliche Auswirkungen auf die Gemeinschaften? Der Beitrag skizziert einige der zentralen Forschungsfragen, die wir berücksichtigen müssen, und weist auf die Notwendigkeit hin, zwischen den Erkenntnissen, die Textilien, tierische Überreste und Werkzeuge zur Textilverarbeitung ermöglichen, zu triangulieren, um zu umfassenderen Ergebnissen zu gelangen. Der Beitrag endet mit dem Hinweis auf eine weitere Forschungsfrage – nämlich, ob die offensichtlichen Unterschiede in der ‚Wollwirtschaft‘ in verschiedenen Teilen Europas in der Bronzezeit auf Unterschiede in der ‚Körperpolitik‘ hindeuten können.

RESUMEN

Producción textil de lana durante la Edad del Bronce en Inglaterra: una reflexión de la evidencia y potenciales, por Mark Haughton, Marie Louise Stig Sørensen, y Lise Bender Jørgensen

En respuesta a los recientes avances en el conocimiento sobre la introducción de las ovejas de lana en Europa y las investigaciones relacionadas con estos restos textiles en el continente, este artículo sostiene que nuestra comprensión del papel de la lana en la Edad del Bronce inglesa necesita ser reevaluado. Sostenemos que las cuestiones relevantes son las referentes a ¿cuándo el abastecimiento y el trabajo de la lana llegan a ser un aspecto rutinario en los asentamientos, y cómo afectó el cambio de las fibras vegetales a la lana a las comunidades? Este artículo describe algunas de las preguntas de investigación fundamentales que necesitamos considerar y señala la necesidad de valorar la evidencia aportada por los textiles, los restos faunísticos y los útiles relacionados con la producción textil, con el objetivo de alcanzar un conocimiento completo. Este artículo acaba señalando una pregunta de investigación adicional sobre si las aparentes diferencias de la economía de la lana en las distintas partes de Europa durante la Edad del Bronce pueden sugerir diferencias en la ‘política corporal’.