

RESEARCH ARTICLE

The Construction, Use, and Discard of Female Identities: Interpreting Spindle Whorls at Vindolanda and Corbridge

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Spindle whorls are one of the most durable traces of the textile craft in the archaeological record. They can be found in copious quantities and diverse types in forts and extramural settlements on the Romano British northern frontier. The connection between spinning tools and female identity, although widely recognised and studied in the burial record, has seldom prompted in-depth observation of whorls and their characteristics, either individually or as assemblages, along the frontiers of the Empire. The following paper will explore how shape, size, decoration, and use wear marks on spindle whorls from Vindolanda and Corbridge can reveal insights into the practice of spinning. By analysing the distribution and physical properties of whorls in the north-western quadrant of Vindolanda, an attempt will also be made to connect the spinning practice to the construction and performance of female identity.

Keywords: Romano-British frontier; Vindolanda; Corbridge; spindle whorls; textile practices; female identity

Introduction

Spindle whorls are essential tools in the process of ancient textile production, and often one of its most durable archaeological traces. Whorls in the shape of discs, cylinders and cones of clay, bone, stone and other more precious materials are widespread in all areas and periods of Roman occupation, ranging from Republican settlements (Tatton-Brown 1992) to Early Roman provincial towns such as ‘Old Virunum’ on Magdalensberg (Gostenčnic 2013: 61) to the Late Roman occupation of forts such as Birdoswald (Wilmott and Hird 1997: 289).

Textile production is rated by Droß-Krüpe (2011: 2) as the second most important economic branch of the Roman Empire after agriculture. Therefore, it is hardly surprising that concentrations of tools related to textile production appear with various degrees of frequency along the Roman *limes*. Yet most of the tools employed in ancient textile making were made of organic or semi-organic material and have not survived in the archaeological record. Spindle whorls, which are made of less perishable materials like pottery, bone, and shale, often make up the highest percentage of textile tools found on a Roman excavation.

The role of provincial armies and outposts within the flourishing market of textile making and trading is a little explored subject. The evidence at *Favianis*/Mautern, a small military fort on the Danube, occupied between the second and fifth centuries AD, seems to indicate the presence of weavers on site, while the scarcity of spinning and sewing implements points towards such tasks being performed elsewhere (Gostenčnic 2013: 72). Bowman and Thomas (1994: 32–35), on the basis of the evidence provided by the Vindolanda tablets, conclude that Vindolanda itself was unlikely to be a primary centre for textile production. Yet, spindle whorls are present at Vindolanda in striking numbers, especially in third and fourth century AD contexts. The abundance of spindle whorls not only at Vindolanda, but also in other forts and civilian settlements along the Romano-British northern frontier, prompted the question behind the following paper: who were the spinners along Hadrian’s Wall?

In this paper, the assemblage approach pioneered by Allason-Jones (1999a; 2001: 23) and Cool and Baxter (2002) will be applied to spindle whorls from the collections at Vindolanda and Corbridge. Spindle whorls will be examined here not only as individual finds, each identified by its own properties, but also as an assemblage, intended as a group of finds sharing common traits. The way the spindle whorls' assemblage interacts with others (e.g. beads or bracelets) will be examined and employed as a tool to explore questions of agency and identity.

Vindolanda and Corbridge, which were excavated in different conditions and with varying degrees of available contextual information, offer the ideal ground to test the validity of a flexible approach to the study of spindle whorls along the frontier. Where finds are lacking tight contextualisation, as happens in Corbridge, the researcher should not dismiss them as uninformative but should instead focus on the information that can be gathered from the physical observation and metric attributes of each artefact. Where tightly contextualized datasets are available, as is the case with the north-western quadrant of the last stone fort at Vindolanda (c. AD 212–410), distributional studies should be facilitated if not directly attempted. The comparison between the two assemblages could assist in finding answers to different questions related to authorship, agency, and the practice of spinning in a military environment.

Brief Anatomy of a Spindle Whorl

The research presented in this paper focuses on theoretical questions stemming from the morphological and contextual analysis of spindle whorls at Vindolanda and Corbridge. Such considerations cannot be removed from a positive identification of what constitutes a spindle whorl. With no typology of Roman spindle whorls on the *limes* yet available, we must rely on the words of Barber (1991: 303):

'There are few practical requirements for [spindle whorls'] shape: they need to be broad enough to help maintain momentum, they may be heavy enough to help with drafting but must not be so heavy that they break the thread; and it helps if they are symmetrical about a central axis so as not to introduce inefficient and irritating wobble into the rotation.'

Gleba (2008: 103–106) stresses the need to abandon typologies based on non-functional parameters, such as decoration, in favour of a typology that considers functional traits such as shape, weight, hole diameter, and ratio between diameter and height. While her 2008 study draws on examples from the material culture of Bronze Age and early Iron Age central Italy, her considerations can be applied to Roman materials (Alberti 2016). For the purposes of this paper, a spindle whorl is defined as an object used in association with a spindle rod, in order to transform raw or prepared fibre into yarn. Spindle whorls can be as light as 2 g (Mårtensson et al. 2006) and, within this study, have been recorded to be as heavy as 60 g. They can be globular, discoid, conical, truncated conical, or cylindrical in shape, following Gleba's (2008: 105) typology. To function, a spindle whorl needs a central perforation with a diameter that can span between 3 and 12.2 mm. Crummy's (1983: 67) criteria stated that 'the perforation should be a minimum of 5 mm in diameter' but Liu (1978: 97) previously recorded whorls whose perforation was as small as 3 mm. The perforation is preferably centred, or would have been before breakage.

Sexing the Spinning Craft in Military Contexts: An Overview

Working within the framework of wider distributional studies of artefacts in military contexts, Allison (2013: 94–95) advocated that 'spinning was only carried out by women, but by women of any status group.' Yet to date, few have followed her steps in analysing the potential of spinning, and the tools related to such craft, as an important indicator of gender within predominantly androcentric contexts such as the forts of the Romano-British frontier. On one hand, we need to remain alert to the possibility that some individuals, or even entire *cohortes*, may have reached Roman Britain from regions where it was the norm for males to spin. On the other hand, spindle whorls were most commonly buried with women, for example at Lankhills cemetery, Winchester (Booth et al. 2010), carried by women in wedding processions (Pliny, *Natural History* 8.74.194), and represented on women's gravestones from Pannonia to Britain as a symbol of adhesion to the set of values appropriate and desirable for a *matrona* (Phillips 1977; Pásztókai-Szeőke 2011). Larsson-Löven (1998: 91–93) and Busana et al. (2012: 417) state how the task of spinning remained in the Roman mind-set 'exclusively related to the feminine world' (original emphasis in Busana et al. 2012: 417) and was charged with strong symbolic implications. This remained true even after the development of textile production from household industry to specialized craftsmanship, which resulted in the delegation of tasks such as weaving to professionals of both sexes.

Literary sources prove difficult to interpret in regard to differentiating spinning for profit, personal use or performance of gendered roles, but the presence of spindle whorls in the archaeological record and their association with female identity are well established. Larsson-Löven (2013: 112) reinforced this association with a study of women and textile work in epigraphic sources, arguing that, 'in epigraphy, the *quasillaria*, spinner, is an exclusively female job with no male counterpart.'

The lack of mention of *quasillaria* in the Vindolanda tablets does not implicate their absence in the archaeological record. As Larsson-Löven (2013: 121) observes, the paucity of spinners in epigraphic and literary sources may well be the result of women not always spinning as a full-time occupation. In particular, in the case of spinning on the frontier, conclusions reached separately by Greene (2013: 498) and Busana et al. (2012: 395) may be supporting this argument. While spinning may have enabled women of lower social status to have a crucial role in supplementing the household income, women of higher standing may have upheld (or made a show of upholding) the habit of spinning and wool working as a manifestation of virtue and irreprehensible moral conduct.

Archaeological evidence for families, including wives and children of both officers and lower ranking soldiers in frontier communities has previously been discussed in detail by authors such as Van Driel-Murray (1995; 1997), Allason-Jones (1999b), Allison (2011), Greene (2013; 2015a; 2015b) and many others. Amongst other finds, footwear, writing tablets, and military diplomas have been used to illustrate the presence of women within frontier communities. In fact, Greene (2013: 495) stresses the importance of interrogating gender specific finds and 'moving away from simply proving the presence of women and families in military communities, to investigating the role of these individuals within military settlements.'

Recent research and revisions of early datasets (Maxfield 2002; Revell 2010; Vass 2010; Birley 2013; Greene 2015a; 2015b) are increasing our awareness of the role of women within the life of a military community. In this paper, I will propose spindle whorls as the signifiers of the spinning craft. I will proceed from the assumption that spinning would have been a gender specific activity, usually performed by female individuals of varying social status.

Alternative interpretations have been considered and discarded. Greene (2015b: 496) advances the hypothesis that spindle whorls could have belonged to men, who acted upon distorted gender roles and performed traditionally feminine tasks due to the lack of female presence inside the fort. When we accept the presence of women within military communities of the third and fourth century AD, irrespective of their residence within or outside the fort walls, this argument ceases to be cogent.

Birley (2002) has convincingly disputed the argument that men would perform usually gendered tasks such as spinning to combat the supposed isolation and idleness of life on the frontier. In his analysis of the Vindolanda tablets, Birley paints the picture of a society in which soldiers and officers are not idle but busy with leave requests (Tablet 174, Birley 2002: 85 or Tab. Vindol. II 174, Bowman and Thomas 1994, plate X), commerce and unpaid debts (Tablet 1187, Birley 2002: 86), hunting (Tablet 233, Birley 2002: 147 or Tab. Vindol. II 233: Bowman and Thomas 1994, plate XVI), banquets and religious celebrations. With the duties and tasks of everyday life far from suspended, soldiers would not likely find themselves in need of diversions. Furthermore, the firm belief that spinning wool and other common animal fibres was degrading for a man of any status (Juvenal 2.54–57) likely sufficed to deter soldiers. The association between spinning and feminine identity was so deeply rooted and implied judgement so customary that it did not fail to reach the highest ranks of society. For example, emperor Elagabalus' love for spinning wool (Cassius Dio, *Roman History* 80.14.4) was said to have worsened his reputation as a weak individual, who was subjugated by the female side of his family.

Could all the spindle whorls from Vindolanda and Corbridge, as well as many other sites along the Romano-British northern frontier, be part of what James (2006: 34) refers to as the Roman equivalent of the 'housewife kit'? Is it possible that a standardised set of sewing and mending equipment, similar to that issued to each soldier in the twentieth-century British army, was assigned to each Roman soldier? This interpretation may be challenged by the whorls themselves, which are not standardised at all. The diversity and variety of shapes, materials, weights, and diameters at both sites points toward a diversification of the types of yarn produced. Such diversification in turn implies a degree of knowledge of the tools and results they can produce, which derives from specific training if not direct involvement in the making of the spindles.

If we assume that men spun in their free time, we should consequently accept the possibility that soldiers were trained in the production of each specific type of yarn and the use of the whorl needed to obtain it. This would have openly clashed with the feminine symbolism connected to spindle whorls throughout the Roman world, from the republican myth of the virtuous spinner Lucretia to the spinners represented on Pannonian gravestones (Pásztókai-Szeöke 2011).

Taking the association between spindle whorls and female gender as a starting point, this paper will argue how the study of spindle whorls may help to further our understanding of the role of textile production in the construction of female identity within a Roman fort. Two research questions will be explored:

1. Did authorship (intended here as the set of choices made by the maker of each spindle whorl regarding weight, shape, and decoration) influence practice (intended here as the way a spinner would use each spindle whorl)?
2. When contextual data is available, for example in the case of Vindolanda, can a distributional study of spindle whorls inform us further regarding the behaviour and economic role of women in military communities?

Discussing the Data: Spindle Whorls at Vindolanda and Corbridge

Authors such as Allison (2013) and Birley (2013; 2016) understood and partially explored the connection between spinning tools and female presence within military communities. The data collected at Vindolanda and Corbridge offers an opportunity, unprecedented on the Romano-British frontier, to push our understanding forward. More in-depth observation of whorls and their attributes has the potential to significantly improve our understanding of the craft of spinning in Romano-British forts and settlements.

Vass (2010: 128) makes a striking point when explaining how, in certain contexts, the interpretation of finds can still be distorted to fit what he calls ‘general clichés.’ For example, spindle whorls found in the Dacian military forts of Buciumi and Răcari have been interpreted as having a different function from producing yarn or have been attributed to the *vicus* rather than the fort in an attempt to refute the presence of women in military contexts (Chirilă et al. 1972: 132; Bondoc and Gudea 2009: 196). Whilst conducting an admirable attempt to revise previous dogmatic interpretations of potentially gendered artefacts, Vass (2010: 132) himself is not free from problematic inferences, such as the assertion that ‘spindle whorls could not be built in any typology as they all look the same.’ His basic statement that size, weight, and the relationship between them affect the type of yarn produced had already been noted by Wild (1970; 2002: 10), expanded upon by Mårtensson et al. (2006), and is treated in all modern guides to spinning such as Franquemont (2009).

Perhaps connected to the lack of a standard typology for Roman Britain is the fact that no comprehensive catalogue of spindle whorls along the Romano-British frontier exists at present. Perforated discs of pottery, bone, shale, and various other materials have been interpreted differently according to the time and place of analysis. A wide range of diameters of both the discs and their perforations has been recorded, as well as a range of thicknesses, decorations, and materials that have so far hindered uniform identification.

Vindolanda, a Roman auxiliary fort and extramural settlement on the Stanegate frontier, was founded in c. AD 85 and occupied almost continuously up to the fourth century AD. During the Vindolanda excavation campaigns, which have been ongoing since 1970, 271 spindle whorls have been identified. The quantities included in this paper represent spindle whorls excavated from 1970 to April 2016—all whorls are accompanied by contextual information, tying each artefact to the archaeological record. In particular the 69 spindle whorls located in the north western quadrant of the third and fourth century AD forts at Vindolanda, occupied between c. AD 212–367 (Birley 2013) have all been carefully plotted. They provide the perfect controlled environment for an attempt at analysing spatial distribution and its implications.

On the other hand, the scarcity or complete lack of contextual information from datasets like the one from Corbridge, resulting from early and dispersed excavations, prompted the formulation of a different approach. 138 de-contextualized spindle whorls were found at Corbridge: here the research focused on the information that could be gained through the study of the spindle whorls’ materials, decorations and patterns of use wear.

Each spindle whorl from both Vindolanda and Corbridge was identified and catalogued by the author following the same procedure, which included a photographic record of both faces and profile (or thickness) of the whorl. The factors considered in the creation of the database were weight, thickness, diameter of the whorl, diameter of the whorl’s central perforation, decoration, and material. All data collected is available in Supplementary Table 1 and a digital photographic catalogue is deposited at the Vindolanda Trust.

While it is important to acknowledge the possibility of a tool’s multifunctionality, some characteristics were common throughout the sample and helped in positively identifying each whorl. These included a weight comprised between 2 and 60 g, a centred perforation, and one or two flat or slightly concave surfaces. Of the 138 whorls from Corbridge, 123 are made of pottery, five are of polished bone, one is of antler, four are of jet or shale, and five are of stone. Within the north-western quadrant of Vindolanda, 54 out of 69

spindle whorls are made of pottery, eight of stone, one of bone, five of jet or shale, and one of cannel coal (Figure 1).

Discoid pottery spindle whorls are predominant at both sites. It is difficult to state with certainty in which cases the clay was purposely shaped to create a spindle whorl from raw materials, and in which cases a sherd of pottery was recycled into a whorl. This is due to the often-significant wear visible on the surfaces of the finds, and to the process that recycled pottery sherds would have undergone to be turned into spindle whorls. A central perforation would have been drilled on a sherd then the edges would have been ground to a smooth and rounded appearance. While some of the whorls recorded in this study have rough edges, which have not been ground, all whorls show a complete or attempted central perforation. This leads us to think that the perforation was completed first and, if successful, the edges of a sherd could have been ground, but could have also remained rough. During both the drilling and the grinding process, the slip on the outer surfaces of the vessel could have been significantly damaged, to the point of disappearing completely, together with any traces of wheel-turning. Such process could have resulted in a body sherd appearing similar to a purpose made ceramic whorl.

For the purposes of this study spindle whorls will be classified into two macro-categories: spindle whorls made of readily available materials will include the finds made of stone and ceramic (mostly recycled pottery) all of which could have easily been picked up from the ground or from discard sites. Spindle whorls in shale, jet, cannel coal, and bone will form a separate category. While it could be argued that bone would have been readily available from discard sites at both Vindolanda and Corbridge, the creation of finely decorated and polished bone spindle whorls would have required a careful selection of the material and, in most cases, the use of a lathe. Such higher quality tools would most likely have had more monetary value than the ones in pottery or stone. Consequently, their role as status indicators would have been as significant as their productive role, if not more.

It is interesting to note that pottery spindle whorls are predominant at 'Old Virunum', interpreted by Gostenčnic (2013) as a primary centre for Magdalensberg textile production. The weight distribution of the 637 complete whorls found at 'Old Virunum' suggest that most of them were light and employed to produce the most delicate threads. It appears therefore that whorls made of recycled material, if correctly shaped, could produce specialised results.

Studies of spindle whorls in the burial record (pioneered by Bietti Sestieri 1993 for pre-Roman Italy) and results of experimental archaeology (Mårtensson et al. 2006) indicate that each spinner would have been proficient, or would have made a display of proficiency through her grave goods, in the making of several types of yarn, requiring spindle whorls of different shapes and weights. Throughout the course of a spinner's life, their level of proficiency could have increased, requiring the purchase or construction of new whorls. Status and financial position could also improve during one's life, allowing the purchase of more expensive tools such as the ones in shale or bone. Likewise, marriage 'dos' (dowry) could have played a significant role in the transmission of tools down the family line.

Unfortunately, cemeteries in the northern military zone are poorly understood (Wilmott 1993: 79) and no burial grounds have been excavated at Vindolanda or Corbridge. The predominant form in which human

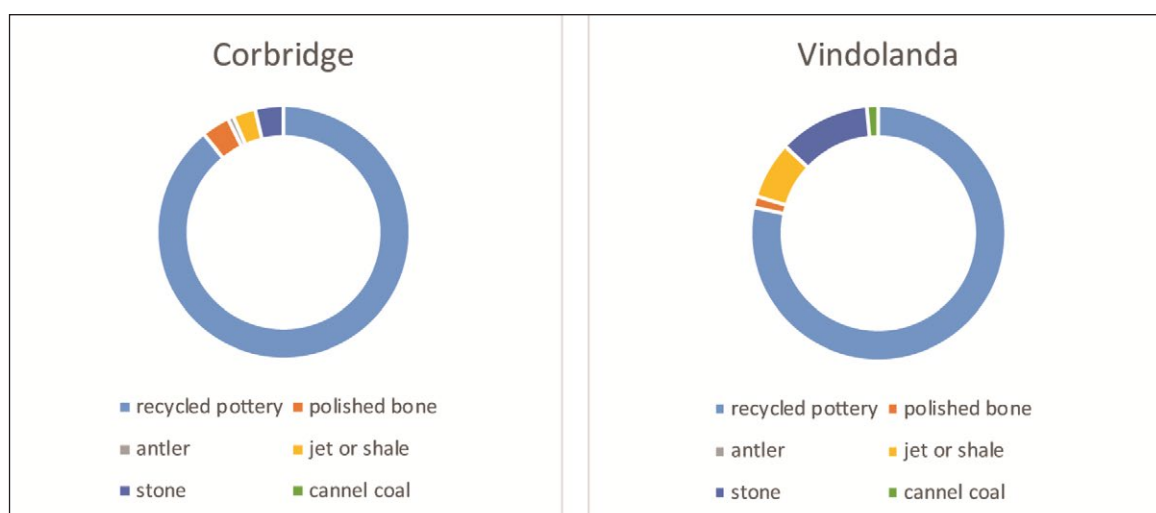


Figure 1: A visual representation of spindle whorls divided by material at Vindolanda and Corbridge.

remains are found in the third and fourth century AD cemetery at Birdoswald (Wilmott 1993: 85), is cremated, which poses great limitations to the possibility of biometric sexing of the bodies. Therefore, the presence and role of high-ranking women (e.g. officers' wives) in the military community, either inside or outside the fort walls (Van Driel-Murray 1995; 1997; Greene 2013) has so far relied on studies of material culture and written or epigraphic sources, including the Vindolanda tablets, burial stones, and altars.

While most written and epigraphic sources may inform us on practices within the high strata of society (e.g. spinning amongst wealthy commanding officers' wives and other powerful women) studies of material culture have the potential to expand our knowledge of practices amongst common women. It is unlikely that the vast number of pottery spindle whorls at both Vindolanda and Corbridge would have belonged exclusively to the few officers' wives whose presence within the military community was sanctioned by the law.

Studies of material culture can provide interesting insights on the manufacture of the less ornate but most widespread objects. Occasional mistakes can be noticed for example in the manufacture of recycled pottery spindle whorls: at Corbridge in CO31578.2, a failed attempt at centring the perforation is clear on one face of the whorl. The perforation was later completed successfully in a more central position. At Vindolanda, five of the 69 spindle whorls appear unfinished and are made from stone or *terra sigillata*; attempts at incomplete perforation can be recognized on one or both faces of the whorls. No unfinished piece in polished bone or shale has been identified at either site so far. This observation may indicate that the production of pottery and stone whorls required a different and less articulated skill-set than those made of bone or shale. Spindle whorls in recycled and readily available materials such as pottery and stone would have been more likely produced by users, slaves, or unskilled labourers and would therefore have been more prone to be left unfinished or show inaccuracies.

On the other hand, it may be too simplistic to suggest a dichotomy according to which amateurs and potential users made all pottery and stone spindle whorls, while whorls in other materials such as jet, shale, and bone were always produced by skilled artisans. A batch of defective pottery, warped and unevenly oxidised, could not have been easily commercialised and might instead have been more readily transformed into spindle whorls by a potter. At the same time, some shale and burnt bone spindle whorls are undecorated and crudely made, their fashioning showing little sign of specialist skills. The making of bone spindle whorls from animal patella (kneecap bone) would have required only the skill necessary to drill a perforation, as the natural semi-globular shape of the bone is apt to produce a spindle whorl.

The production of both decorated and plain spindle whorls, with the attention to and knowledge of weights, dimensions, and proportions required may have been closely intertwined with the construction of a feminine identity. González-Ruibal et al. (2011: 1) citing Hodder (1982: 85–86), states that 'artefacts are considered to be meaningfully constituted and, as symbols, to be actively manipulated by social actors to attain certain ends, such as acquiring or legitimising status (...) or performing gender.' An interesting ethnographic example of such phenomenon can be found in the Awa tribe in Brazil (González-Ruibal et al. 2011). Here males fulfil gender and status roles by making arrows with wood and feathers. The production of arrows is always in surplus when compared to the real needs of the tribe, or even of the individual. The arrows, used for everyday subsistence hunting, represent the male contribution to the economy of the society, but also define identity and belonging, or exclusion, from a certain group (Chittock 2014: 323).

Certain elements within the Awa arrow-making process appear to be comparable, with due caution, to the making of spindle whorls in readily available materials in Romano-British forts. The making of a recycled pottery whorl may be interpreted as both an answer to a practical need and desire to conform to gender's role, but at the same time it could embody a woman's contribution to the subsistence of a military family. Social construction of feminine identity through the manufacture of spindle whorls may not need to imply conscious human agency. Ontological research applied to archaeology and anthropology has long stated the need to overcome the preconception that 'things are only activated by human agency' (González-Ruibal et al. 2011: 5). In other words, women at Vindolanda and Corbridge may have been making spindle whorls from recycled pottery sherds because they needed them, or because that was the womanly thing to do. Either way, they would have consciously or unconsciously activated the social construction of their own identity through the action of making and using the spinning tool.

Discussing the Data: Decoration

Just as arrows in the Awa tribe vary in shape, size, and individual decoration and function (González-Ruibal et al. 2011: 8), so do spindle whorls along the Romano-British northern frontier. Most spindle whorls in shale, bone, and cancell coal bear some form of decoration. 57% at Vindolanda and 60% at Corbridge bear

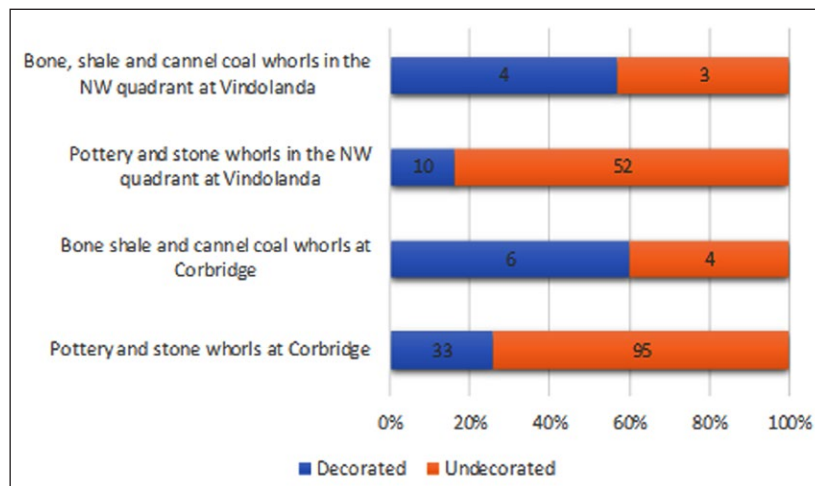


Figure 2: Percentage of decorated and non-decorated pottery spindle whorls compared with decorated and non-decorated bone and shale whorls, at Corbridge and in the north-western quadrant at Vindolanda.



Figure 3: Ovolo decorations pertaining to the *terra sigillata* vessel of origin can be seen on whorl CO35776 (Author's photo 2017).

decoration in the form of one or more concentric circles, located on one or both faces and the profile (or thickness) of the whorl. Pottery whorls tend to be plain: only 16% at Vindolanda and 26% at Corbridge bear a form of decoration, which is always part of the pot of origin rather than added after the re-purposing of the sherd into a whorl (see **Figure 2**). Decoration on pottery whorls is always located on one face only, and never on the profile. Stone spindle whorls at both sites never bear decorations.

The most frequent type of pottery employed in the production of spindle whorls is *terra sigillata*: 49% of spindle whorls at Corbridge are obtained from recycled sherds of Samian pottery, compared with 39% of the spindle whorls in the north-western quadrant at Vindolanda. The second most used material is Black Burnished Ware (types one and two, as codified in Williams 1977 and exemplified for the Vindolanda assemblage by Bidwell 1985). Both types of pottery bear decorations exclusively on the exterior face of the vessel. The decoration, in the case of the *terra sigillata* whorls, can be either part of the figurative pattern (as in CO35725) or part of a geometric decoration. Ovolo decorations on *terra sigillata* whorls can be seen in CO35776 (**Figure 3**) and lattice on Black Burnished is visible in CO21559 (**Figure 4**).



Figure 4: Lattice decorations pertaining to the Black Burnished vessel of origin can be seen on whorl CO21559 (Author's photo 2017).

Occasionally functional elements of a pot are incorporated into functional elements of a spindle whorl. This is particularly true for whorls obtained from repurposed *terra sigillata* sherds. Bases are detached from the body of the vessel; a central perforation is added and the edges (where the base used to be attached to the body of the vessel) are ground. Such a process creates a whorl shaped like a small cup, with one concave side and one flat surface. Rim sherds including sufficient amount of body can be shaped to obtain a whorl with a slight 'lip' or irregularity, which could have perhaps enhanced grip.

Terra sigillata whorls at Vindolanda and Corbridge display little to no sign of use on their decorated faces. Rather than being an aesthetic choice, this may relate to the optimal shape for holding yarn: concave rather than convex. Decorations are usually located on the convex side of a vessel, which is less apt to hold a cone of spun yarn steadily in place, as it allows the yarn to slip along the sides. In the following paragraphs the relationship existing between shape, decoration, and use wear of spindle whorls will be discussed together with the influence such factors can exert on the practice of spinning.

Discussing the Data: Use Wear Analysis

The changes which occur through the life cycle of an object are often overlooked by researchers but can be investigated using functional analysis. Functional analysis is defined by Marreiros et al. (2015: 2) as 'based on the study and observation of physical alterations made on active areas and edges of tools made and used by human population'. In the case of spindle whorls, one of the most important and yet under researched aspects of functional analysis is the study of use wear marks.

No experimental archaeology has so far been conducted concerning the formation of use wear traces on Roman spindle whorls, yet consistent patterns of wear can be noticed by the naked eye on 41% of pottery spindle whorls at Vindolanda, and on 54% at Corbridge. In the case of spindle whorls in bone or shale, 71% show use wear traces at Vindolanda and 90% at Corbridge.

Use wear marks consisting of a highly polished sub-circular 'shadow', observed consistently on pottery, bone, and shale whorls, may have been left by the cop (the cone of spun yarn) resting on one or both faces of the whorl. The friction between the whorl and the retention point on the spindle rod, as well as the frequent act of inserting and removing a whorl from a rod, could also have contributed to wear traces regularly observed around the central perforation in both Vindolanda and Corbridge assemblages. It remains to be noted that the lack of experimental archaeology on the specific subject of use wear analysis of spindle

whorls means we cannot exclude the possibility that both types of wear may have occurred during the re-purposing of the sherd into a whorl (e.g. during drilling or grinding of the edges).

One could argue that, in the case of pottery whorls, signs of wear on the slips and surfaces could also be attributed to the life of the sherds as part of vessels, rather than to their use as whorls. However, when comparing wear traces on bone whorls with the ones on pottery whorls, the recurring sub-circular trace can be seen on at least one face of each object. In the case of bone whorls, the wear trace appears as an area much more polished than the surrounding surface. Such polishing may have been caused by friction: when the spindle whorl is in motion, the cop of spun yarn is not still but turns lightly with it, polishing the flat surface of the whorl onto which it is stored (Franquemont 2009: 29). On pottery whorls, the use wear trace can be seen in the form of wearing of the edges, with the slip of the pot's fabric remaining relatively undamaged in a sub-circular shape around the central perforation, as shown in **Figure 5**. Sub-circular traces on one or both sides of the whorl appear in 39% of Vindolanda's spindle whorls and in 55% of Corbridge's assemblage, making it unlikely that such regularly shaped and positioned wear traces could have pre-dated each object's use as a whorl.

When comparing the position of use wear marks with the position of decorations in the Vindolanda and Corbridge assemblages a few interesting remarks can be made. Distinctly sub-circular traces of use wear appear always on the face opposite to the decoration on pottery spindle whorls, both at Vindolanda and at Corbridge. When traces of wear around the perforation appear, they are more prominent on the same face as the decoration, and therefore, on the opposite face of the sub-circular traces. Such a pattern may indicate a preferred practice of spinning with pottery whorls—the decorated face would not have been used to accumulate spun yarn. In other words, there may have been a correct and an incorrect way to set up and use a pottery whorl.

In the case of bone, jet, or shale spindle whorls, sub-circular use wear traces are found on both faces of the whorl, together with concentric circular decorations, and are often contained and delimited by them. Personal communication with modern day spinners, crafting, and using both contemporary and archaeological replica spindle whorls, has highlighted an interesting interpretation of circular incised decorations. According to the spinners, grooves cut on the flat surfaces of a whorl appear to help retention of the spun yarn, avoiding slippage. Slippage in turn can cause instability and affect the regular momentum of a whorl.

In two cases (pottery whorl SF13648 and burnished bone whorl SF12488 from Vindolanda), a *graffito* marks or points toward the less worn face. The *graffito* on SF13648 consists of a simple X, which frequently appears on *terra sigillata* vessels at Vindolanda and perhaps indicates ownership (Birley 2008: 30). This may pre-date the transformation from sherd to whorl. On the other hand, the *graffito* on SF12488 (**Figure 6**) is likely contemporary or posterior to the creation of the whorl itself: it represents a triangle, the point indicating the opposite direction from the most worn face. The incision could be interpreted as indicating which face of the whorl should have been inserted in the rod and which face should have stored the spun yarn.

A similar, if more explicit, example is reported by Wild (1970: 33), who mentions a whorl from Trier (Löwenbrücken) bearing on opposite faces the *graffito* 'imple me' (load me up) and 'sic versa me' (turn me this way). When analysed in conjunction with decorative motifs, patterns of wear appear to suggest that decorations on spindle whorls, far from being a stylistic choice or a mere coincidence, would have guided the spinner to standard practice.

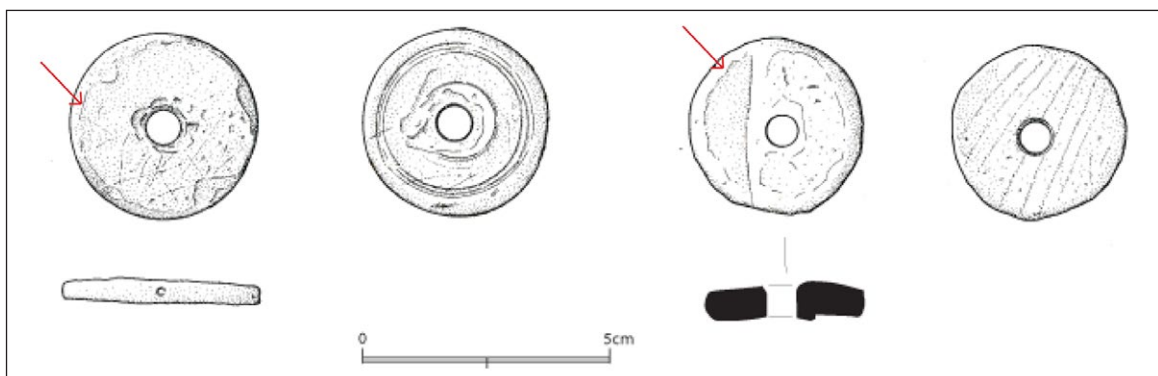


Figure 5: A shale spindle whorl (SF 15534, to the left) compared to a pottery spindle whorl (SF 13155, to the right). The red arrows indicate the edge of the sub-circular wear observed. Both finds are from Vindolanda. Drawing by Mark Hoyle.

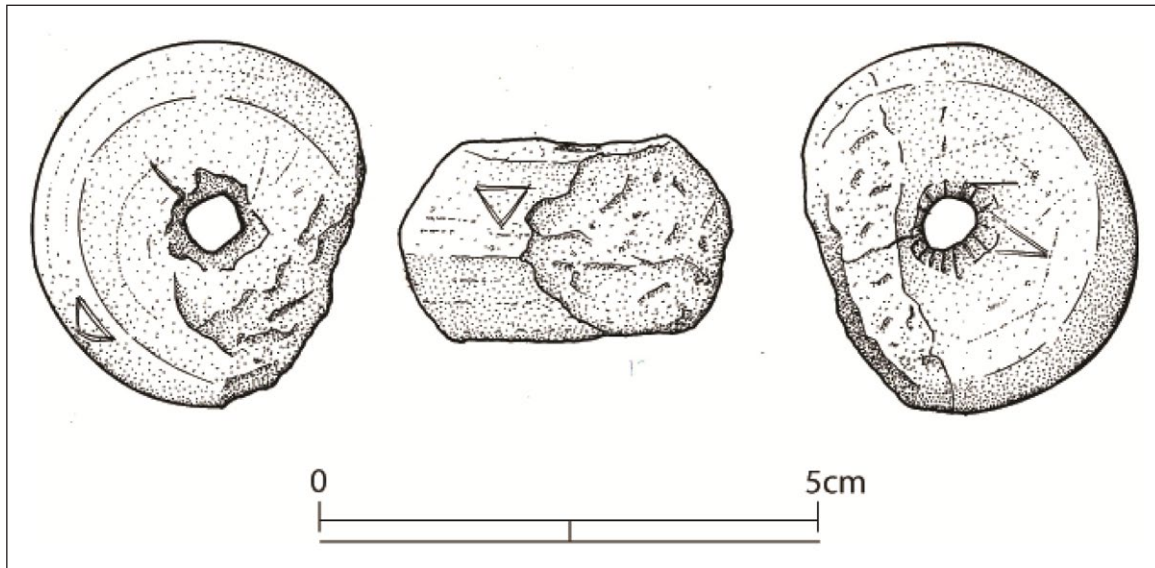


Figure 6: SF 12488 is a shale biconical whorl. The vertex of the triangle shaped *graffito*, visible on the profile of the whorl, points towards the less worn face. Drawing by Mark Hoyle.

Distribution Patterns of Spindle Whorls in the North-Western Quadrant at Vindolanda

Analysis of distribution patterns of spindle whorls, when based on tightly contextualised datasets and mindful of the processes of site formation, can add interesting insights to our understanding of standard practice of spinning in Roman forts.

Allison (2013: 3) states that for a useful investigation of artefact distribution patterns three preliminary steps must be fulfilled. As a first step, the researcher needs to understand the activity with which the artefacts may be associated. Spindle whorls in both ceramic and non-ceramic materials at Vindolanda and Corbridge are intrinsically associated with the practice of spinning, which in turn may be connected to the performance of feminine gender and feminine agency within the economy of a Roman fort.

The need to understand the type of people associated with a specific item of material culture is the second point in Allison's argument. The relationship between use wear patterns, decorations, and shape of spindle whorls at the two sites points in the direction of active participation of the spinner, whatever their social status, in making or choosing the tools. Decorations on spindle whorls may be there to not only fulfil a stylistic choice but also to absolve a precise function. Decorative patterns could guide the user in the practice of spinning and be either intentionally or subconsciously selected and interpreted by each spinner. The greater number of pottery spindle whorls in relation to those manufactured from polished bone and shale may also suggest that, to the known but restricted group of high-ranking women employing high quality tools, we may have to add numerous spinners of lower rank and means who chose to use tools self-produced with readily available materials. If this is true, then 'common' women and women of servile status could have had a significant role in the practice of spinning along the northern frontier.

The third and last point in Allison's (2013: 3) argument is that an understanding of the distribution of activities and their associated identities within military bases 'can be used to investigate communities inside the walls.' Birley (2013; 2016) applies aspects of Allison's spatial methodology to the Vindolanda dataset, looking at distributional patterns of three main assemblages. Weapons and pieces of military kit are associated with combatants while spindle whorls and items of personal adornment (e.g. hairpins and bracelets) are associated with non-combatants exemplified by adult women. Finds related to gaming and productivity are associated with shared activities.

While Whitmore (2016: 142) states how 'the presence of women in military spaces is not unexpected', Birley (2016) goes further, and details how the material culture from third and fourth century AD intramural contexts at Vindolanda could provide compelling evidence for the presence and active role of women in the community. Sixteen bracelets in various materials, described by Gardner (2007: 131) as *personalia* displayed and used by women, have been recovered in third century AD contexts within the north-western quadrant of the last stone fort. More than four times the amount (66 bracelets) was found in fourth-century AD contexts from the same area. Quantities are equally striking when hairpins and beads are taken in consideration; for

example, the number of beads found in intramural contexts increases from 34 in the third century AD to 76 in the fourth century AD (Birley 2016: 162). While concentrations of individual classes of artefacts in a room or area are not sufficient to determine a space as 'gendered', stratified clusters of potentially gendered artefacts of different classes (bracelets, beads, textile tools) may inform us as to what activities took place in certain areas of a Roman fort.

The discussion that follows aims to address Birley's (2016: 159) consideration that, for Vindolanda, 'an analysis of the spindle whorl distribution from intramural contexts could... be used to support the theory that women were present inside the fort.' It is to be noted that the third and fourth century AD major construction phases hereby considered were not completely sealed by new layers of construction (Birley 2013: 86; 2016), making disturbance and movement of artefacts more likely than in deeper levels. Patterns of deposition cannot therefore be interpreted as indicative of exactly where an activity took place, as much as the fact that it did take place (Whitmore 2016).

Fifteen spindle whorls have been found in habitation contexts (floors and roads) in the north-western quadrant of the period VII fort at Vindolanda (c. AD 212–280). Of these, 13 are made of pottery, one is made of stone, and one of shale. Thirteen pottery spindle whorls and the stone one were located inside 'chalet type' accommodation spaces. The term 'chalet barracks' (Collins 2012: 52) is used here to describe three N-S oriented, rectangular buildings, which are divided each into nine spaces: eight rectangular *contubernia*, and one larger room that could have accommodated junior officers. It is interesting to note how the shale whorl, of finer manufacture than the ceramic examples, is not located in the officers' quarters but in one of the *contubernia*, surrounded by three other pottery spindle whorls. In the space interpreted as the junior officer's private room, a single pottery spindle whorl was found (Figure 7).



Figure 7: Spindle whorls in readily available materials and one shale spindle whorl uncovered in third century AD contexts in the north-western quadrant excavations at Vindolanda (Source: Vindolanda Trust).

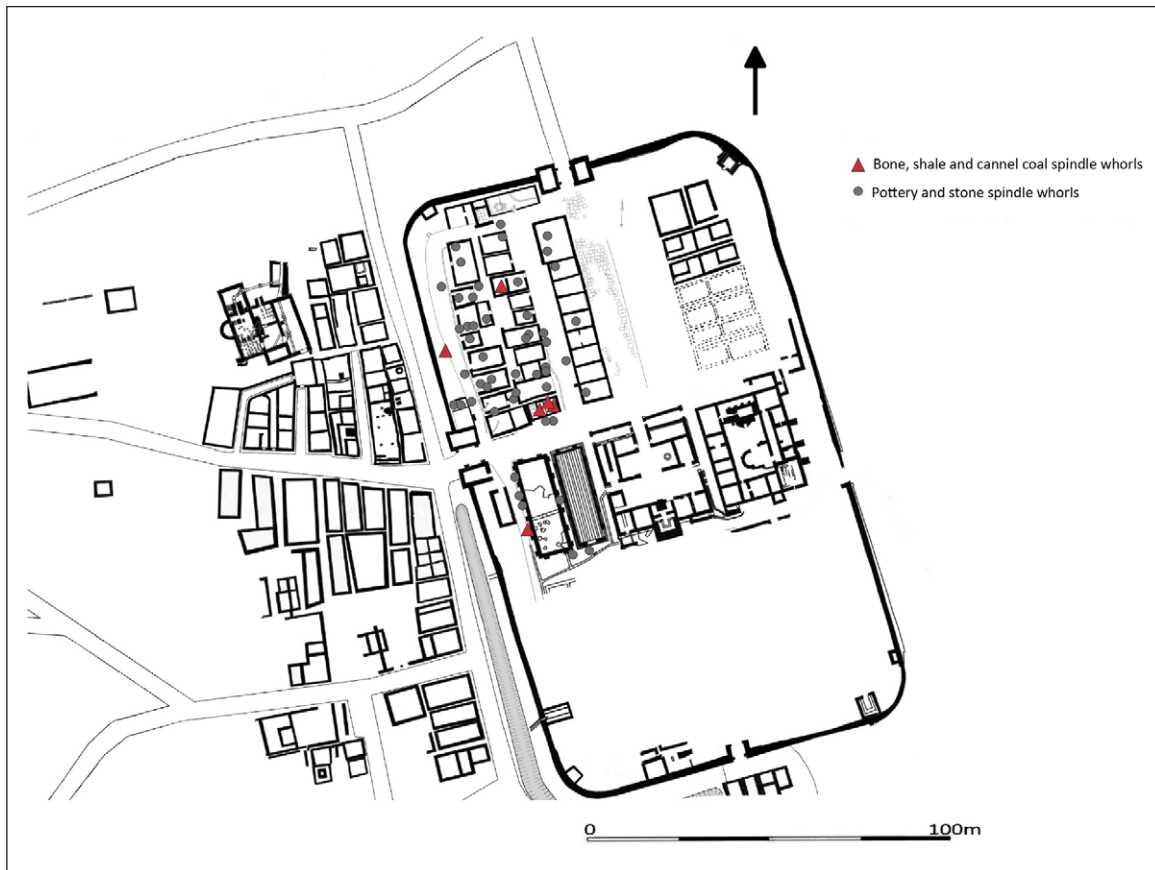


Figure 8: Spindle whorls in readily available materials and spindle whorls in shale, bone, and cannel coal uncovered in fourth-century contexts in the north-western quadrant excavations at Vindolanda (Source: Vindolanda Trust).

The distribution pattern seen in **Figure 7** indicates that even in spaces traditionally associated with officers and their families, pottery spindle whorls were predominant during the third century AD occupation of the fort. The evidence gathered seems to contradict the assumption that only higher-ranking women could take part in the spinning work inside the fort: if the former had been the case, then we would have expected to see many more spindle whorls in jet, shale, or bone in the areas traditionally associated with upper strata of the fort's society.

This conclusion gains further support from the distribution of whorls in the period VIII stone fort (AD 300–367). Forty-eight whorls in readily available materials are evenly distributed throughout the quadrant, while, of six whorls in shale, bone, and cannel coal, three have been discarded or lost in a space interpreted as an officers' *schola* (Birley 2013) (**Figure 8**).

The evidence provided not only by the spindle whorls, but also by beads and bracelets from third and fourth century AD intramural contexts at Vindolanda seems to complement the evidence from the early German forts studied by Allison (2013). Her study of wider classes of small find patterns in early forts of the German provinces (first and early second century AD) remains the closest parallel for the present work. When we compare the German data with both third and fourth century AD distribution patterns of spindle whorls at Vindolanda, we find support for the idea that 'women... had a considerable impact inside the fort walls' (Allison 2013: 353).

Conclusions

Spindle whorls continue to be one of the most under-researched classes of artefacts in Roman Britain. The apparent simplicity of a spindle whorl has perhaps been the main obstacle to a uniform definition and the lack of this has, in turn, hindered more in-depth research. Key features that identify a Romano-British spindle whorl have remained until now open to debate, leading to disagreements concerning the identification of whorls. This paper has narrowed down defining criteria to produce the description of an average Romano-British spindle whorl. A whorl can be discoid, cylindrical, semi-globular, or biconical and can be made of various materials

including ceramic (predominantly re-proposed sherds of pottery), bone, jet or shale, stone, or lead. It should weigh between 2 g and 60 g and should have a central perforation of diameter between 3 and 12.2 mm.

The premise has been argued that spindle whorls would have been associated with the craft of spinning, which in turn could have related to the creation and performance of female identity. Moving on from such assumption, this paper has aimed to discuss how simple, cost-effective analysis of the physical characteristics of spindle whorls, including shape, decoration, and use wear, can yield valuable information on the practice of spinning within military communities, even when the artefacts are not tightly contextualised. For example, the predominance of spindle whorls made of recycled pottery has been emphasised at both Corbridge and Vindolanda. It has been proposed that such high percentage could have indicated the presence of a higher number of low-status/low-means spinners than previously expected.

The study of the relationship between decoration, shape, and use wear traces on spindle whorls has also yielded some interesting information. It has been inferred that decoration on spindle whorls would have not simply been determined by aesthetic choices but could have assumed functional significance. Circular incised grooves on the surfaces on which spun yarn was accumulated could have helped maintain the yarn in place, avoiding slippage, and the subsequent negative impact on a spindle whorl's rotation. Such a hypothesis seems to be confirmed by the observation that, on jet and shale spindle whorls at both Corbridge and Vindolanda, use wear traces appear to be contained within the decoration's perimeter. Decorative patterns, usually located on the convex side of a vessel, appear to show little to no sign of wear in most recycled pottery whorls at Vindolanda and Corbridge. It has been suggested that decoration could have been used as a conscious or subconscious cue, suggesting to the spinner which way to use the spindle whorl (e.g. which side should have been used to accumulate spun yarn).

When information on contexts and the process of site formation is available, further inferences can be made from the observation of patterns of distribution. At Vindolanda it was possible to observe how the percentage and distribution of spindle whorls in readily available materials changed between the third and the fourth century AD occupation of the fort, and how it compared with percentage and distribution of purpose made whorls in jet, shale or bone. The hypothesis was advanced that spinners of both low and high social status would have been operating or discarding their tools within the fort in both the third and the fourth century AD, with increased occurrences in the fourth century, when the extramural settlement was in a state of abandonment. The association between spindle whorls and female identity, combined with the analysis of distribution patterns of spindle whorls and other assemblages appears to contribute to the theory that women were present and invested with a productive role within the fort walls at Vindolanda.

Much remains to be done to enrich our understanding of the agency and practice of spinning along the Romano-British northern frontier. A complete catalogue and typology of Roman spindle whorls along Hadrian's Wall and in Roman Britain is a necessary preliminary step. Rigorous experimental archaeology focusing on the creation of use wear marks is desirable, together with the application of standardised recording methods for spindle whorls recovered in future excavations. Such steps will facilitate the analysis of make, wear, and discard pattern of spindle whorls in Roman contexts. A deeper study of spindle whorls can reveal valuable insights on how spinners of both low and high rank consciously or unconsciously created and performed their identities through the everyday action of turning fibres into yarn.

Additional File

The additional file for this article can be found as follows:

- **Supplementary table 1.** Spindle whorls from the north-western quadrant of the last stone forts at Vindolanda and from Corbridge. DOI: <https://doi.org/10.16995/traj.241.s1>

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A copy of the complete photographic database is freely available upon request and deposited digitally at the Vindolanda Trust.

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Competing Interests

The author has no competing interests to declare.

Abbreviations

Tab. Vindol. II *Tabulae Vindolandenses II* – Bowman, A.K. and Thomas J.D. 1994. *The Vindolanda Writing-Tablets (Tabulae Vindolandenses II)*. London: British Museum Press.

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