

Woven Cultures: New Insights into Pictish and Viking Culture Contact Using the Implements of Textile Production

By Lindsey Stirling¹ and Karen Milek²

THIS PAPER PRESENTS a new approach to Pictish and Viking culture contact in Orkney using the material culture of everyday life, focusing in this case on implements used in textile production. The production of textiles was a major component of everyday life between the 5th and 12th centuries and the tools of production have survived well in the archaeological record. This paper uses a study of the implements used in textile production from six Viking and Pictish period sites on Orkney to assess the nature of textile production at this time and investigate whether or not it was affected by the arrival of Scandinavians. The results demonstrate that significant changes took place at the beginning of the Viking Age, with different thicknesses of thread being spun and woven, new materials and styles of artefacts being used, and new types of tools employed for particular tasks. The early Viking Age (9th–10th centuries) produced a great variety of textile tools, representing both Pictish and Scandinavian practices, suggesting a time of transition in which both Pictish and Viking styles were accommodated.

Viking-Age Scotland lies at the centre of a longstanding debate over the nature of contact between incoming Vikings and the native Picts and Scots. The debate has ranged from theories suggesting the replacement of the native population by incoming Norse to those that emphasise the integration of the two cultures; indeed a regionally diverse picture is currently preferred.³ Research has been carried out using various forms of archaeological and place-name evidence, with the stylistic study of artefacts and the attribution of styles to ‘Norse’ or ‘Pictish’ origins considered primary to interpretations about the nature of contact.

Textiles were powerful mediators of identity and status. The flexibility of fabric type, weaving style, colour, pattern and cut of the clothing allowed many different styles to be worn and displayed.⁴ During the Viking and Pictish periods, many hours were likely spent on the production of textiles, probably on a daily basis, but preserved examples of Pictish and Viking period textiles in Scotland, and specifically Orkney, are few, although exceptions do exist.⁵ In contrast, many of the tools used in textile production, which were made from bone, stone, clay, or metal, do survive. Study of these objects can provide important information about the textiles they were employed to make and the production processes involved. Previous studies of textile equipment in other parts of the British Isles and Scandinavia have demonstrated that this artefact category has the potential to tell us not only about the functional aspects of textile production but also about social changes, immigration patterns, the production and exchange of knowledge, and the nature of culture contacts.⁶

Textile production can be divided into four main activities: preparation of the raw materials, spinning, weaving, and the cutting, sewing and elaboration of the fabric into the final product. The main raw materials used during the Pictish and Viking periods were wool and flax. Wool was combed to align the fibres for spinning,⁷ while flax preparation involved separating the fibre from the plant through a process of soaking and pounding, ending with heckling, where the plant fibres are drawn through iron teeth to separate them.⁸ Spinning was done with a spindle rod, usually made out of wood, with a whorl attached to one end as a weight to help it spin. The ‘drop-and-spin’ method was commonly used, where the spindle

was spun by hand and dropped so that it was suspended in the air while spinning, with the whorl at the bottom.⁹ In the Pictish period weaving may have been done on either a warp-weighted vertical loom, as practiced in Anglo-Saxon England, or a two-beam vertical loom, exemplified in pre-Viking Ireland, where the warp was stretched between two horizontal beams attached to two uprights, and the weft was beaten downwards so that the cloth was made from the bottom up.¹⁰ Weaving in Viking-Age Scandinavia and Viking Ireland was done on the warp-weighted loom, in which the vertical warp threads were attached to the horizontal cloth beam at the top of the loom and were tied at the bottom to loomweights of equal size and weight to keep them evenly taut.¹¹ Alternate warp threads were hung in front of and behind a fixed horizontal shed rod, creating a space between which the weft could be passed. The back threads were passed through a long loop of thread attached to a movable heddle rod, which created a 'counter-shed' when the heddle rod was lifted forward. Weaving on the warp-weighted loom was done at the top of the loom, with the weft thread being woven in by hand and then beaten up using a bone or metal pin beater and weaving batten.¹² Finally the cloth could be cut and sewn together in different ways to make clothing and sails, with the use of fine metal needles for thin fabrics and larger bone needles for more coarse fabrics.¹³

Experimental archaeology undertaken on Bronze Age Mediterranean loomweights and spindle whorls has shown that the weight and thickness of this equipment can reveal much about the threads and textiles they were used to make.¹⁴ The principles of these experiments were used in the study of textile equipment from the Scandinavian towns of Birka, in Sweden, Hedeby, in Denmark and Kaupang, in Norway.¹⁵ This paper aims to look at the functional aspects of these artefacts as insight into textile production in Iron Age and early medieval Orkney, as well as their less functional aspects, eg shape, material and decoration, which may have been more deeply embedded in cultural traditions.

In Britain comparable studies of textile production equipment have been conducted for Anglo-Saxon and Anglo-Scandinavian England.¹⁶ The collection from Coppergate, York, covers the period in which the Norse were in direct contact with the Anglo-Saxons. Penelope Walton Rogers found that while Norse artefacts demonstrated a Scandinavian presence in York, the textile related assemblage was primarily Anglo-Saxon in character.¹⁷ She argued that the textile production process was carried out predominantly, although perhaps not exclusively, by women in the 9th to 12th centuries and that the lack of Scandinavian influence on the textile implements, due to the lack of female settlers, meant that the textile production assemblage retained its Anglo-Saxon character.¹⁸ This paper, in contrast, focuses on interactions between Scandinavians and Picts in northern Scotland, where the number of female Scandinavian settlers is thought to have been much greater, based on the larger number of female Scandinavian graves in Scotland, many of which contain textile production equipment.¹⁹

This paper presents a study of early medieval textile production in the Orkney Islands and is the first detailed study of textile tools from early medieval Scotland. Alongside Steven Ashby's research on combs from the North Atlantic, this paper is also one of the first studies to use a particular group of artefacts to shed light on Pictish-Viking relations.²⁰ As a pilot exploration, it focuses on the implements of textile production from a select group of sites in Orkney. A detailed analysis of the artefact types, their materials, weight, size, form, and decoration, is used to assess the nature of textile production in this region, to demonstrate changes in implements over time, and to investigate whether these artefacts can reveal something about the nature of Pictish-Viking relations.

THE STUDY AREA

Orkney was selected due to the high number of well-published sites with large numbers of textile related artefacts dating from the late Iron Age to the late Viking Age. Settlement sites rather than burials were chosen as the focus, because they spanned several centuries, offering information on changes over time. Six settlement sites from the Orkney Isles were selected on the basis that they had textile implements in their artefact assemblages datable to the Pictish and/or Viking period, and these had been accessioned by a museum and were available for study. The sites discussed are: the Brough of Birsay, Buckquoy, Howe, Pool, Saevar Howe and Skail (Fig 1). Each artefact from these sites was attributed a date on the basis of the information on context and phasing provided by the site publications (Tab 1).

The Brough of Birsay is the location of a Pictish settlement, which was subsequently overlain by a Norse settlement, and, eventually, a 12th-century church.²¹ An assemblage of 63 artefacts, including spindle whorls, loomweights, needles and needle cases was used in this study, the majority of which were ascribed to the late Pictish or early Viking period based on their associated contexts.

The nearby site of Buckquoy featured a series of superimposed farm buildings, interpreted by the excavator as initially Pictish then Viking in character.²² A Viking burial was also present but it contained no textile related artefacts. This site had the smallest assemblage of textile implements, with only six spindle whorls from the late Pictish and early Viking-Age contexts.

At Howe a Neolithic settlement was followed by an early Iron Age roundhouse and a late Iron Age broch.²³ There is no Viking-Age material at Howe, but there is a large Pictish and Iron Age assemblage, which offers important comparative data for this study. The assemblage from Howe consisted of 72 artefacts, including bobbins, long handled combs, loomweights, needles and spindle whorls from the early Iron Age to late Pictish periods and is the only site to have artefacts from the early and late Iron Age.

The site of Pool on Sanday also had a Neolithic and Iron Age occupation, which continued throughout the Pictish and Viking periods.²⁴ Pool provided a large assemblage of 79 artefacts, including spindle whorls, loomweights, long handled combs, needles, needle cases, bobbins and a pin beater. Artefacts from Pool could be dated to the key time of transition between the late Pictish and early Viking periods but there were also, importantly, artefacts from the early Pictish period and late Viking period, providing a greater time depth for study.

Saevar Howe, similar to Buckquoy, is the site of a Pictish settlement overlain by a Viking settlement.²⁵ The artefact assemblage contained 47 spindle whorls and loomweights — considerably more loomweights than any of the other sites. Although this site represents both Pictish and Viking occupation the majority of the stratified artefacts were attributed to the early Viking period.

The final site, Skail, Deerness, has Bronze Age remains followed by an Iron Age roundhouse, with subsequent occupation in the Pictish period and a Norse settlement nearby.²⁶ Its 41 textile related artefacts, including long handled combs, loomweights, needles and spindle whorls, came from the Pictish and Norse parts of the site and can be dated to the early Pictish to early Viking periods.

METHODS AND APPROACHES

All of the sites included in this study contained well-dated assemblages of artefacts related to textile production. Of these, the most common implements were spindle whorls and loomweights, key components of the spinning and weaving processes, with functional characteristics (weight, diameter, hole diameter, thickness and length) indicative of the kinds of threads and fabrics they were used to make.²⁷ Spindle whorls were small weights, which came in a variety of sizes and shapes, with a central perforation where a spindle would have been attached. It has been noted that many very small spindle whorls can be difficult to distinguish from beads and in this study only artefacts described as spindle whorls in site publications have been included.²⁸ Similarly, loomweights can be difficult to distinguish from other perforated weights such as net or line sinkers when they are not found in a row where a loom was burnt in situ, and were only included in this study where they were specifically described as loomweights in publications.²⁹ Physical characteristics of spindle whorls and loomweights, such as their shapes, materials, and ornamentation, were also analysed because of their clear potential to mediate identities.

Other types of textile implements do not have a direct impact on the character of the textiles produced, but were included in this study because they were part of the textile toolkit and were potentially subject to cultural influences. Pin beaters were small, pointed tools made of bone or wood, which were used alternately with a weaving batten to beat the weft during weaving on the warp-weighted loom.³⁰ Long handled combs of bone or antler have a wide head, with numbers of teeth varying between eight and eighteen, and a long handle commonly around 100 mm in length. They have commonly been found on Iron Age sites in Scotland and while it has been suggested they may have functioned as a wool comb, they are generally regarded as a weft-beating tool.³¹ While long handled combs are generally interpreted as tools used with the two-beam vertical loom, double-ended ('cigar-shaped') pin beaters and sword-shaped weaving battens are generally associated with warp-weighted looms due to their chronological concurrence.³² In physical terms there is no rationale for a preference, and long handled combs and single-ended pin beaters could well have been used to beat up the weft when weaving on a warp-weighted loom.³³

Bone and metal needles were predominantly used for sewing, although they could have been used for other crafts than the production of textiles, such as net making, net mending and leatherworking.³⁴ Needle cases, used to hold fine metal needles, were made from hollow bones around 60–80 mm in length and had a central perforation, which may have allowed the case to be suspended from a belt.³⁵ Bobbins, also made of bone, were around 100 mm in length with a central perforation and were used to hold thread for sewing or as shuttles for the weft during weaving.³⁶

The physical attributes of the artefacts in the study were recorded in person at Tankerness House Museum, Orkney, and at the National Museum of Scotland, Edinburgh. Measurements were taken of weight, diameter, diameter of hole, thickness and length, with the features recorded varying according to artefact type (Fig 2). In the case of incomplete artefacts the full measurements were estimated where possible. The material composition of the artefacts was also recorded and attributed to one of five categories: bone, clay, lead, steatite and other stone (Figs 3–4). For the purposes of this discussion steatite and other types of stone were treated separately, since steatite is not native to Orkney (though it is to nearby Shetland) and is generally considered to be a Viking introduction. Other stone types, such as sandstone, siltstone and schist, were commonly used for whorls in Iron Age and Pictish Scotland,³⁷ while a predominantly clay spindle whorl tradition is associated with the

Norse, and sites such as Kaupang also produced high numbers of lead whorls.³⁸ The shapes of spindle whorls and loomweights were recorded since this facilitates classification. For spindle whorls seven categories were used — hemispherical (often referred to as 'plano-convex'), flat, conical, biconical, spherical, femur head and irregular — while loomweights were classed as either discoid, pear-shaped or other (Fig 4, Fig 5).

RESULTS

SPINNING IMPLEMENTS

The evidence for spinning in early medieval Orkney comes in the form of 170 spindle whorls, of which the material, shape, weight, diameter, diameter of hole, and decorations or embellishments were recorded and analysed. In all cases it was possible to identify the shape and material of the whorl, but 22 were incomplete and for these the weight, diameter and diameter of hole of a complete whorl were estimated on the basis of the surviving fragment and the percentage it represented of the whole (Tab 2). Of the 170 whorls, 136 could be assigned a date, and the remaining 34 were classed as unstratified (Tab 3).

The majority of spindle whorls in the assemblage from Orkney were made from stone or steatite, with lesser numbers made from bone, possibly due to preservation bias, and very small numbers made from clay and lead. Stone and bone whorls were common across all time periods, while whorls of clay, lead or steatite did not appear until the early Viking period, with the exception of one steatite whorl found in an early Iron Age midden context at Howe.³⁹ The appearance of new materials and the predominance of steatite over other stone types in the early Viking period strongly suggest that preferences and sources of whorls made from these materials were introduced by Scandinavian settlers.

The majority of spindle whorls across all the time periods were flat in shape, with the hemispherical shape also common from the late Pictish period onwards. Nearly all bone whorls were made from femur heads of ox, deer or cattle, and were found across all time periods. The other shapes were found in much lesser numbers, with spherical and biconical shapes limited to the Pictish period and conical and irregular shapes found only in the Viking Period. Conical whorls are commonly found on Scandinavian sites, such as Kaupang,⁴⁰ and the replacement of biconical and spherical whorls with shapes typically associated with Viking-Age Scandinavia suggests that there was a Scandinavian influence on textile production.

It was only possible to calculate the weight of 155 out of 170 spindle whorls, since some were only preserved as fragments; these weights ranged from 2–89 g, with the majority being 10–39 g. Bone whorls were the lightest, but this was probably not a true representation of their weight since they are highly susceptible to decay over time. Stone whorls had a bimodal distribution of weights, with modes at 10–14 g and then again at 35–39 g, while the distribution of steatite whorl weights had a mode at 25–29 g. Since even a difference of 5 g can affect the thickness of the yarn, this suggests that a range of different threads were being produced.⁴¹

Change through time was also seen in the weights of spindle whorls (Fig 6). Whorls from the Iron Age and Pictish periods covered a range of weights but were predominantly 10–14 g, and could have been used to spin threads of 0.4–0.6 mm, suggesting textiles with a thread count of 15–25 threads/cm could have been made. In comparison, modern fabrics, such as bed sheets, can have around 30–50 threads/cm. These threads and fabrics would

have been multifunctional and able to meet everyday needs for clothing and sails. There was a further cluster in weights at 35–39 g but this was more pronounced in the Iron Age than the Pictish Period. This suggests that in the Iron Age the focus was on two main qualities of yarn, while in the Pictish period less emphasis was placed on the heavier threads.

In the Viking-Age whorls of 20–29 g — double the weight of those common in the Pictish period — became common. This weight had close parallels to the spindle whorls found at Viking-Age Kaupang in Norway, suggesting that this change was brought about by the arrival of Scandinavians. These whorls were best suited to producing medium to thin yarn but in reality would have been capable of producing threads of many different qualities.⁴² Despite the dominance of whorls weighing 20–29 g, a large range of other weights were also present, with a number of whorls weighing less than 10 g or more than 50 g.

The diameter of all the whorls was recorded and ranges from 22–50 mm, with a clear concentration between 30–44 mm. The diameter may indicate whether wool or flax was being spun, since experimental work has shown that larger diameters were better suited for flax because they prevented the thread from falling off the spindle before the spindle was full.⁴³ The weight and diameter were directly proportional and were affected, to some extent, by the material. The lead whorls were generally heavier with smaller diameters, while the lighter bone whorls have larger diameters with smaller weights. Smaller diameters were better for spinning tight threads and the lead whorls may have been used for spinning strong but tight threads.⁴⁴ Change in the diameter of the whorls reflected a similar pattern to changes in weight, with smaller diameters of 30–39 mm being most common in the Pictish periods and slightly larger diameters of 35–44 mm frequent in the Viking Age.

The diameter of the hole was only measured for 154 whorls since some were too fragmentary and others were unfinished ‘roughouts’ that had yet to be perforated. The size ranged from 3–19 mm but the majority had a perforation of 6–11 mm. This gives an indication of the thickness of the spindle rod used, which would have added to the overall weight of the spindle, affecting the thickness of thread that could be spun. There was not a huge variation in size in the Orkney assemblage, suggesting that spindle rod size and therefore its contribution to the overall weight did not vary greatly. While the weight and diameter suggest that the main focus changed to coarser threads in the Viking Age, this does not seem to have impacted the size of the spindle, probably because finer threads continued to be made as well.

Eight spindle whorls were decorated, seven with a mixture of pits and incised lines and one with an ogham inscription (Tab 4, Fig 7). The ogham inscription has been translated as ‘blessing on the soul of L’, with ‘L’ denoting a personal name.⁴⁵ Decoration suggests that these whorls were personalised objects, valued by their owners and possibly used to express cultural identity. With the exception of the late Pictish ogham-inscribed whorl, all the stratified decorated whorls came from the early or late Viking Age. This suggests that people may have been more inclined to personalise their tools at this time, possibly because society was going through a period of change and people felt the need to express their identity through familiar objects.

WEAVING IMPLEMENTS

Loomweights were the most common weaving equipment found and a total of 55 examples were recorded, although many of the clay weights were fragmentary in nature and 30 incomplete examples could not be included in the discussion of weight, thickness or diameter of hole (Tab 5). Of the 55 loomweights included in this study, 47 could be assigned a date and the remaining 8 were classed as unstratified (Tab 6). The majority of the weights came from the early Viking Age, due to the large assemblage from Saevar Howe, which probably represented a set of weights from the same loom.⁴⁶ However, 11 loomweights included in this study came from pre-Viking contexts, and, although it remains difficult to firmly identify all perforated weights as loomweights, the presence of a significant number of perforated weights (identified in publications as loomweights) in Iron Age Howe and Pictish contexts at Pool, as well as other Iron Age sites in Orkney, suggests that the warp-weighted loom was used on at least some sites in pre-Viking Orkney, as it was in Iron Age and Anglo-Saxon England.⁴⁷

Most of the loomweights were made from unbaked clay, all of which came from Saevar Howe. These, and the other baked clay loomweights, all dated to the early Viking period. All of the clay weights were discoid in shape and this may be due to the ease of making uniform shapes from this material. Large numbers of clay loomweights were characteristic of Viking sites such as Birka, Sweden, and in Orkney are likely to reflect Scandinavian influence, although clay loomweights are also common in Anglo-Saxon England.⁴⁸ Sandstone loomweights were present across all periods and were particularly popular in the late Iron Age and the late Pictish period. In the Viking Age other material types, such as clay, steatite and other stone types, came into use, suggesting that loomweights of these materials were introduced to Orkney by Viking settlers. Pear-shaped weights were also a Viking-Age phenomenon and since stone weights of this type were not common on Scandinavian sites, they may indicate a new style of loomweight particular to Vikings in Scotland.

It was possible to calculate the weights of 22 loomweights, which ranged from 146–1964 g, with the majority between 200 g and 800 g, and only three greater than 1200 g. The late Iron Age examples from Howe were all over 1000 g in contrast to the Pictish and Viking examples, which were nearly all less than 800 g (Fig 8). The heavier Iron Age loomweights are comparable to the heavier weight standard in Iron Age southern Britain. The heavy loomweights coincide with a large number of spindle whorls weighing over 35 g, which would have been well suited to spinning much thicker threads. Iron Age households in Orkney may have been producing coarse as well as finer textiles but the production of the coarser textiles declined in the Pictish Period. A larger assemblage of loomweights came from the Viking Age, with most coming from Saevar Howe and weighing 300–400 g. Based on calculations by Mårtensson, loomweights weighing 200–800 g would have been well suited to weaving with threads requiring 20–50 g warp tension, which would have been appropriate for weaving a range of fabric qualities (coarse to fine) and would certainly have met everyday needs.⁴⁹ This is very similar to the evidence of weaving presented by loomweights at Kaupang and at other Scandinavian towns.⁵⁰

The thickness of 28 loomweights was measured and was found to range from 13–71 mm, with a concentration between 20 mm and 49 mm. A comparison of weight, thickness and material shows that baked and unbaked clay loom weights were more uniform in weight and thickness than those of the different stone types, suggesting it was easier to make loomweights of equal sizes out of clay. It was advantageous to have loomweights of equal thicknesses on the same loom because they kept the warp threads hanging straight,

allowing an even fabric to be woven.⁵¹ All of the unbaked clay loomweights were found in a group at Saevar Howe, suggesting that they were from the same loom, and a loom using weights of this type would have been well fitted to weaving a wide range of fabrics using both fine and coarse threads.

The diameter of the hole was recorded for 23 loomweights and varied from 6–74 mm, with most having a perforation less than 19 mm in diameter. There was, however, a group of stone loomweights from late Iron Age Howe with much larger perforations (which were also much heavier) and these may have been to accommodate more warp threads per loomweight so that they did not snap. This suggests that Iron Age looms were not limited to coarse-threaded textiles (as analysis of the weight alone might suggest) but could also produce fine-threaded fabrics by attaching more threads to each loomweight.

Other tools used in the weaving process were weft beaters, such as long handled combs and pin beaters, and bobbins for holding weft thread. The use of these artefacts changed over time, indicating changes in cultural traditions. The sites of Howe, Pool and Skail produced 19 long handled combs, mostly of antler and cetacean bone (Tab 7, Fig 9b). These combs all came from Iron Age and Pictish contexts with the exception of one from a late Viking context, which was probably redeposited.⁵²

One pin beater came from the site of Pool and although it was not mentioned in the site monograph (Hunter 2007) it was examined first hand in Tankerness House Museum. It was made from antler or cetacean bone and was 146 mm in length (Fig 9a). This double-ended pin beater came from an unstratified context, but was similar to a number of pin beaters found in Viking contexts at the site of Freswick Links, Caithness.⁵³ The change in weft beaters from long handled combs in the Iron Age and Pictish periods to sword and pin beaters in the Viking Age shows that a completely different tool was being used for the same task and this change was likely the result of incoming Scandinavian settlers.

Six artefacts described as bone bobbins were found on the sites examined for this study — four from Howe and two from Pool — and were probably used to hold lengths of weft thread for weaving (Tab 8, Fig 9d). All six were broken and the remaining lengths ranged from 50–98 mm. Like long handled combs, they were restricted to the Iron Age and Pictish periods, suggesting that different tools and methods for storing thread were in use in the Viking Age.

SEWING IMPLEMENTS

Fifty-one bone needles were recorded from Brough of Birsay, Howe, Pool and Skail, although only 39 were complete examples (Tab 9, Fig 9e). The lengths varied from 23–111 mm, with a concentration between 40–59 mm, and this suggests that the needles were used for different types of sewing and maybe even other tasks, such as making nets. Dates were assigned to 37 needles on the basis of their stratigraphic context and were compared to their length. The Iron Age and Pictish examples tended to be less than 60 mm in length while those from the late Viking period were all greater than 70 mm, suggesting that the bone needles were being used for different tasks in the Pictish and Viking periods. Not all needles were necessarily used for sewing but could have been used for tasks such as making nets or they may have served other functions in textile production, such as pattern weaving or single-needle knitting.⁵⁴

Six needle cases of hollow bone were recorded, three from Brough of Birsay and three from Pool (Tab 10, Fig 9c). Two of the cases from Pool still held their contents, with an x-ray of find 146 from Pool showing two iron needles intact inside.⁵⁵ The use of metal

needles suggests that fine thread was in use and that the fabric had a high thread count, since it would be difficult to sew a coarse fabric with such a thin needle.⁵⁶ The only stratified examples were from Viking contexts and may suggest a type of fine quality sewing that was not present in the Pictish period. Alternatively, needle cases may represent a new artefact type introduced by Scandinavian settlers.

DISCUSSION

THE NATURE OF TEXTILE PRODUCTION IN ORKNEY

The results outlined above (summarised in Fig 10) can be used to gain an insight into the nature of textile production in Orkney in the Iron Age, Pictish and Viking periods, with the artefacts indicating that spinning was taking place on all sites and weaving at all sites but Buckquoy. This suggests that textile production was not an exclusive activity and that people from all sites had the skills to partake in it.

The weights of spindle whorls in the Iron Age and Pictish period cluster around 10–14 g and in the early Viking period between 20–29 g, both of which could have produced a wide variety of threads capable of meeting everyday needs for clothing and sails. The Iron Age also had a number of whorls weighing 35–39 g, suggesting that there was a secondary focus on thicker threads as well. The weights of both spindle whorls and loomweights had a tendency to become lighter in the Pictish period, suggesting that there was a shift to finer fabrics at this time and possibly an increase in the use of flax over wool. Study of the actual textile remains from Iron Age and Pictish Scotland has been minimal, making results such as this extremely significant to the further study of textile production in Scotland.

Textile production in Iron Age, Pictish and Viking Orkney can be characterised mainly as production for everyday household use, since there is little evidence of very fine or specialised production.⁵⁷ The Brough of Birsay may provide evidence of more specialised production, with three whorls lighter than 10 g, which were able to spin very fine threads, and one loom weight of only 146 g, which would have been well suited to weaving such fine threads. It was also the only site to have lead whorls, which may have been used because of their heavy weight but small size, allowing tight but strong threads to be spun.⁵⁸ The interpretation of the Brough of Birsay as a relatively high status site could explain why textiles of higher quality (eg made with finer threads) seem to have been made there.⁵⁹ The nearby site of Buckquoy had very few textile tools and no loomweights at all and it may have relied on the Brough of Birsay for its textile needs.

The artefact assemblages in Orkney show a clear shift in the nature of textile production from the early to late Viking Age. In the early Viking period there was a greater variety of tools ranging in both size and weight, allowing threads and textiles of many different qualities to be produced. However, in the late Viking Age the same degree of variation is no longer evident: the weights of spindle whorls show a clear concentration between 20–34 g, a pattern similar to Kaupang. Textile production may have become more standardised, perhaps in order to produce a standard homespun cloth product (Old Norse *vaðmal*) that could be traded. Trade of this cloth was extremely important to other North Atlantic settlements, especially Iceland, where trade goods were valued in *vaðmal*.⁶⁰ The importance of this cloth as an exchange and trade commodity in Scotland is, however, relatively unknown. While there is no doubt that this pilot study needs to be built upon with similarly detailed analyses of other early medieval sites in Scotland, the patterns observed in

these artefact assemblages from Orkney suggest a period of transition between Pictish and Viking textile production followed by a move to more standardised Scandinavian production.

WOVEN CULTURES

It was clear from the artefacts examined here that significant changes in textile production were taking place in the late 8th and early 9th centuries, apparent in both functional and stylistic aspects of the artefacts. One of the most notable changes was in the material used to make them. The spindle whorls and loomweights of the Iron Age and Pictish periods were all made using stone or bone, yet in the Viking Age the use of steatite became dominant and other new materials, such as clay and lead, came into use.

The presence of steatite in Orkney can clearly be associated with the arrival of the Vikings. The material was not found naturally on the islands, the nearest source being quarries on Shetland, though it may have also come from Norway. Steatite bowls were a characteristic Norse artefact and 18 of the steatite whorls examined here were fashioned from sherds of steatite vessels. All this points towards the conclusion that steatite, as a material for making textile implements, was introduced by the Vikings.

Many of the Orcadian whorls were sherds of steatite vessels, suggesting that steatite was not readily available and people were more conservative in their uses of it. The use of steatite may represent a desire to *be* Scandinavian or to express an affiliation with Scandinavian identities, but the availability of (or lack of) steatite may have impacted the way in which 'Scandinavianness' could be expressed. The use of other stone types also continued into the Viking Age, possibly indicating the continuation of some native Pictish traditions.

Lead as a material for spindle whorls also first appeared in the Viking Age, evidenced in three examples from the Brough of Birsay. Other lead whorls were also found in the Viking-Age phases of the Brough of Deerness, Orkney, Jarlshof and the late Norse sites of Biggings, Shetland and Freswick Links, Caithness, while at Kaupang they make up 30% of the whole assemblage.⁶¹ Extensive metal detecting was used to explain the unusually large numbers of lead whorls at Kaupang, but such large numbers may also suggest that this material was favoured by the inhabitants and represents a particularly Norwegian trait.⁶² The sites of Brough of Birsay, Brough of Deerness and Jarlshof have all been interpreted as relatively high status sites, suggesting that lead spindle whorls were status objects, perhaps only accessible to those with privileged access to Norwegian trade networks.⁶³ The whorls were in fact very similar in shape and weight to those from the settlement area at Kaupang,⁶⁴ suggesting that they may have been imported from Norway or from the same region that supplied the lead weights found in Norway, if chemical analysis eventually reveals this to be elsewhere.

The final new material seen in the Viking-Age textile implements in Orkney was clay, especially for loomweights. Both Saevar Howe and Skail have clay loomweights, with the group of 28 weights from Saevar Howe possibly representing an in situ loom. Many of the clay weights were fragmentary and the lack of loomweights on other sites may be due to preservation conditions. The use of clay loomweights was common across Scandinavia and was seen at Kaupang, Birka and Hedeby.⁶⁵

It is important to note, however, **that** there was also the continued use of other materials for loomweights. Sandstone and other stone types had been used since the Iron Age in Orkney and loomweights executed in these materials were still present in the Viking

Age at the same sites that had adopted the new materials. Therefore, while some Scandinavian traits seem to have been adopted, we also see the continuation of native traditions. The shapes of spindle whorls also underwent changes in the early Viking period, with the introduction of conical whorls and an increase in hemispherical whorls. These shapes were most common in Kaupang, Birka and Hedeby, and their presence in Orkney is almost certainly due to the arrival of Viking settlers. In contrast, biconical and spherical shapes appear to go out of use at the end of the Pictish period. These shapes had a very limited representation in the Kaupang settlement assemblage but have been found on other Iron Age sites in Orkney — the Broch of Burrian and the Broch of Gurness.⁶⁶ Although these shapes are only really found in small numbers, they were confined to the Iron Age and Pictish periods in Scotland. They may represent a native tradition that was not continued when the Vikings arrived, either because different people were producing the textiles or because people were making conscious choices to use the 'new' shapes of spindle whorls.

Yet, while some new shapes were introduced, there was also continuity: both flat and femur head whorls were common throughout all the periods studied. This could be because these were shapes already known to and used by Vikings in Scandinavia, albeit in lesser numbers. For many of these whorls, the shapes were also determined by the material — femur head whorls naturally being the shape of the animal bone. It is therefore difficult to say whether or not the continuity of these shapes was due directly to Pictish influence.

There were significant differences in the types of weaving implements used between the Pictish and Viking periods. Bobbins were limited to the Iron Age and Pictish period but were remarkably similar to the needle cases found in Viking-Age contexts: both have a perforation through the middle and they tend to be of similar length. Walton Rogers suggests that some needle cases, like bobbins, may have had sewing thread wrapped around them.⁶⁷ The central perforation of needle cases may have been to facilitate their attachment to a belt.⁶⁸ These artefacts may or may not have served similar purposes, but represent a way of doing things that was particular either to the Picts (in the case of bobbins) or the Vikings (needle cases). The change indicates that people with a new tradition of knowledge and practice were appearing in Orkney, and did not choose to utilise the bobbins they would have encountered there.

Long handled combs were strongly associated with the Iron Age in Scotland and have been found in many Iron Age and Pictish contexts in Orkney. Yet, significantly, they were entirely absent from Viking-Age contexts, where sword and pin beaters were used instead. Walton Rogers argues that toothed weft-beaters such as long handled combs are normally associated with the two-beam vertical loom,⁶⁹ but their possible use to beat up the weft on a warp-weighted loom has also been noted, and their association with putative loomweights at the Pool, Skail, and other Iron Age sites in Orkney, suggests that this rule might not hold in the very north of Britain.⁷⁰ If this rule *were* to hold, the implication would be that an entirely new type of loom — the warp-weighted loom — was introduced into Orkney with Scandinavian settlers, replacing the two-beam loom. One double-ended pin beater came from the site of Pool and other comparable artefacts were found at Freswick Links, Caithness and Jarlshof, Shetland.⁷¹ The presence of sword beaters was also attested from Viking burials, such as the Scar boat burial, Orkney.⁷² Both sword-beaters and double-ended pin beaters are regarded by Walton Rogers as associated with warp-weighted looms, which does match the loom-weight evidence in Orkney.⁷³ Whether or not the loss of toothed weft-beaters also signifies the loss of the two-beamed loom, people in Viking-Age

Orkney were clearly using different tools for the same tasks, suggesting potentially conscious changes in cultural tradition.

As seen in the evidence above, significant changes in textile production coincided with the arrival of Viking settlers in Scotland in the late 8th to early 9th centuries. Scandinavian styles were apparent in both the materials and shapes of tools, but also in the artefact types used. Since some native Pictish implements and practices also continued to be used, the evidence suggests knowledge exchange and conscious, selective uptake and integration of implements and practices by both the native Picts and the Scandinavian settlers. We therefore suggest that Viking-Age textile production in Orkney was neither fully Scandinavian nor fully Pictish, but a transition between the two in which each group had an influence on the practice of the craft. This evidence supports the model proposed by Leslie Abrams, in which Viking settlement of new areas did not mean simply becoming native, but was a mixture of interactions with local people and Scandinavian societies, in which different aspects of Scandinavian culture may have been emphasised or abandoned.⁷⁴

This mixed influence may have led to new styles of artefacts and textiles that reflected and actively contributed to the identity of a people who were no longer simply just Scandinavian or Pictish, but 'Picto-Scandinavian'. In her discussion of Anglo-Scandinavian brooches in the Danelaw, Jane Kershaw suggests that women's brooches, and dress more widely, played an important role in the configuration of identity, and, 'that women, whether ethnically Scandinavian or not, had a special status in reconfiguring and communicating Scandinavian identity in the British Isles'.⁷⁵ While brooches may have been more explicit indicators and agents of status and identity, the same concepts can be applied to the everyday implements of textile production and the styles of cloth (and therefore clothing) they produced. In the same way as artwork on dress accessories is likely to have been embedded in and expressive of particular ideologies and thereby had an active role in perpetuating them,⁷⁶ the style or material of everyday craftwork implements can create cognitive links to certain traditions, histories, peoples, and places, and consciously or subconsciously express, appropriate, or negotiate particular identities. We should not underestimate the agency of everyday items in the negotiation of social relations between the Picts and Vikings.

CONCLUSION: FROM TEXTILE PRODUCTION TO SOCIAL RELATIONS

This paper set out to investigate whether or not the artefacts used for textile production in Orkney could reveal something about the nature of contact between the Picts and Vikings in this region, and the results show that the study of textile tools can indeed give new and important insights into social relations. It is clear that major social changes took place in Viking-Age Scotland and that textile production was one of many aspects of everyday life that played a role in how individuals in this new society found their place in it. Scandinavian styles of artefacts became prominent and the functional aspects of these shared much with assemblages from Scandinavia. However, the assemblage from Orkney was not a typical Viking-Age Scandinavian assemblage: some of the artefacts may have been local adaptations to the natural resources of Orkney, while others indicated the continuation of Pictish styles. The variety of textile tools and the variety of textiles that they could produce suggests that the early Viking Age was a period of coexistence and dialogue, with people and textile related material culture expressing and actively facilitating affiliations to both cultures simultaneously. While there was a strong Scandinavian

influence, it did not mean that the native culture was obliterated, as suggested by some writers.⁷⁷

Importantly, the presumed role of women in textile production in the early medieval period⁷⁸ places them centre stage in the dialogue between everyday practices and the emergence of distinctive, new Picto-Scandinavian identities in Orkney. There can be no doubt that women formed a significant proportion of the Scandinavian migrant population in Orkney. The migration of Viking women is attested by the genetics of the modern population and may be inferred from biologically sexed female Scandinavian-style graves in Scotland,⁷⁹ although, until stable isotope analyses are conducted on their dental enamel, and aDNA studies are completed, the possibility remains open that these were the graves of indigenous Pictish women who had married into Scandinavian families and had subsequently been buried in the Scandinavian style. At Coppergate, York, the fact that the textile assemblage kept much of its Anglo-Saxon character, even after the arrival of Scandinavians, was interpreted as an indication of a lack of Scandinavian women in this region.⁸⁰ In comparison, the significant changes in the textile implements seen in Orkney suggests that Scandinavian women were migrating and were actively involved with knowledge exchange related to textile production. However, evidence of the migration of Scandinavian women should not downplay the role of native women. If it is possible that some Scandinavian-style graves could represent native women who married into Viking communities, bringing their own cultural traditions, it will be important to complement this study with a more detailed consideration of the textile related artefacts found in graves to assess whether they are Pictish or Scandinavian in character. A biologically-sexed female Scandinavian-style grave at Westness, Rousay, for example, contained a silver brooch pin of insular design, which was interpreted by the excavator as evidence of intermarriage.⁸¹ In light of the results of this study, it is also possible to interpret this grave as belonging to woman who, along with her family, identified with a new Picto-Scandinavian identity, regardless of whether she was genetically Pict or Norse.

From the perspective of textile production, culture contact between the Picts and Vikings was not a matter of Scandinavian domination. Instead, there seems to have been survival of some Pictish textile traditions, suggesting a period of knowledge exchange and, for at least a short period, the emergence of modes of textile production that were neither wholly Viking nor wholly Pictish in character. It is impossible to know who was using these tools and whether they thought of themselves as Pictish or Viking, or Picto-Scandinavian. It is also important to remember that the picture outlined above is of Orkney, just one region of Scotland. Other evidence from place names and settlements has suggested that the nature of culture contact between the Picts and Vikings varied geographically. Thus, further study of the textile tools from other parts of Scotland is needed to gain a full understanding of social relations at this time, and their regional variations. While this study has focused on evidence from settlement sites, it should not be forgotten that implements of textile production have also commonly been found in Scandinavian-style graves and the study of artefacts in these contexts have the potential to add further to our understanding of Pictish-Viking relations.

ACKNOWLEDGEMENTS

This research would not have been possible without the assistance of Dr Martin Goldberg at the National Museum of Scotland, Lynda Aiano at Tankerness House Museum, Orkney and

Beverley Ballin Smith. The authors also wish to thank the two anonymous reviewers who provided valuable comments on earlier versions of this paper.

BIBLIOGRAPHY

- Abrams, L 2012, 'Diaspora and identity in the Viking Age', *Early Medieval Europe* **20**:1, 17–38.
- Andersson, E 2003, *Excavations in the Black Earth 1990–1995: Tools for Textile Production from Birka and Hedeby*, *Birka Studies* **8**.
- Andersson Strand, E, Frei, K M, Gleba, M, Mannering, U, Nosch, M, and Skals, I 2010, 'Old textiles — new possibilities', *European J of Archaeol* **13**:2, 149–73.
- Andersson Strand, E 2011, 'Tools and textiles — production and organisation in Birka and Hedeby', in S Sigmundsson (ed), *Viking Settlements and Viking Society: Papers from the Proceedings of the Sixteenth Viking Congress, Reykjavik and Reykholt, 16–23 August 2009*, Reykjavik: University of Iceland Press, 1–17.
- Ashby, S 2009, 'Combs, contact and chronology: reconsidering hair combs in early-historic and Viking-Age Atlantic Scotland', *Medieval Archaeol* **53**, 1–33.
- Bäcklund, J 2001, 'War or peace? The relations between the Picts and the Norse in Orkney', *Northern Stud* **36**, 33–47.
- Ballin Smith, B 1994, *Howe: Four Millennia of Orkney Prehistory*, Soc of Antiquaries of Scot Monogr Series **9**.
- Barrett, J H 2003, 'Culture contact in Viking Age Scotland', in J H Barrett (ed), *Contact, Continuity, and Collapse: The Norse Colonization of the North Atlantic*, Turnhout: Brepols, 73–112.
- Barrett, J H 2004, 'Beyond war or peace: the study of culture contact in Viking Age Scotland', in J Hines et al (eds), *Land, Sea and Home*, Society for Medieval Archaeol Monogr **20**, 207–18.
- Batey, C E 1987, *Freswick Links, Caithness: A Re-appraisal of the Late Norse site in its Context*, Brit Archaeol Rep Ser **179**.
- Brundle, A, Lorimer, D H, and Ritchie, A 2003, 'Buckquoy revisited', in J Downes and A Ritchie (eds), *Sea Change: Orkney and Northern Europe in the Later Iron Age AD 300–800*, Forfar: The Pinkfoot Press, 95–104.
- Buteux, S 1997, *Settlements at Skail, Deerness, Orkney: Excavations by Peter Gelling of the Prehistoric, Pictish, Viking and Later Periods, 1963–1981*, Brit Archaeol Rep Ser **260**.
- Crawford, B E 1987, *Scandinavian Scotland*, Leicester: Leicester University Press.
- Crawford, I A 1981, 'War or peace — Viking colonisation in the Northern and Western Isles of Scotland', in H Bekker-Nielsen, P Foote and O Olsen (eds), *Proceedings of the Eighth Viking Congress, Århus 24–31 August 1977*, Odense: Odense University Press, 259–70.
- Crawford, B E and Ballin Smith, B 1999, *The Biggings, Papa Stour, Shetland: the history and excavation of a royal Norwegian Farm*, Soc of Antiq of Scot Monogr Ser **15**.
- Cruden, S 1958, 'Earl Thorfinn the Mighty and the Brough of Birsay', in K Eldjárn (ed), *Proceedings of the Third Viking Congress, Reykjavik 1956*, Reykjavik: Ísafoldarprentsmiðja, 156–62.
- Cruden, S 1965, 'Excavations at Birsay, Orkney', in A Small (ed), *The Fourth Viking Congress, York, August 1961*, Edinburgh: Oliver and Boyd, 22–31.
- Curle, C L 1982, *Pictish and Norse Finds from the Brough of Birsay 1934–74*, Soc of Antiq of Scot Monogr Ser **1**.

- Fitzgerald, M A, 2000, Textile Production in Prehistoric and Early Medieval Ireland (unpubl PhD thesis, Manchester Metropolitan University).
- Forsyth, K 1995, 'The ogham-inscribed spindle-whorl from Buckquoy: evidence for the Irish language in pre-Viking Orkney', *Proc Soc of Antiq of Scot* **125**, 677–96.
- Gabra-Sanders, T 1998, 'A review of Viking-Age textiles and fibres from Scotland: an interim report', in L Bender Jørgensen and C Rinaldo (eds), *Textiles in European Archaeology: Report from the 6th NESAT Symposium, 7–11th May 1996 in Borås, Sweden*, Göteborg: Göteborg University, 177–86.
- Gerrard, J, Barrett, J and Saunders, M 2010, The Brough of Deerness Excavations 2009: Annual Data Structure Report, unpubl rep, Cambridge: McDonald Institute for Archaeological Research.
- Graham-Campbell, J and Batey, C E 1998, *Vikings in Scotland: An Archaeological Survey*, Edinburgh: Edinburgh University Press.
- Hamilton, J R C 1956, *Excavations at Jarlshof, Shetland*, London: Her Majesty's Stationery Office.
- Hedenstierna-Jonson, C 2006, 'Borre style metalwork in the material culture of the Birka warriors', *Fornvännen* **101**, 312–22.
- Hedges, J W 1983, 'Trial excavations on Pictish and Viking settlements at Saevar Howe, Birsay, Orkney', *Glasgow Archaeol J* **10**, 73–124.
- Hedges, J W 1987, *Bu, Gurness and the Brochs of Orkney. Part II: Gurness*, Brit Archaeol Rep Ser **164**.
- Helgason, A, Hickey, E, Goodacre, S et al 2001, 'mtDNA and the Islands of the North Atlantic: Estimating the Proportions of Norse and Gaelic Ancestry', *Am J of Hum Genetics* **68**, 723.
- Henry, P A 1998, 'Textiles as indices of late Saxon social dynamics', in L Bender Jørgensen and C Rinaldo (eds), *Textiles in European Archaeology*, GOTARC Series A, Volume **1**, Göteborg: Göteborg University.
- Henshall, A S 1950, 'Textiles and weaving appliances in prehistoric Britain', *Proc of the Prehist Soc* **16**, 130–62.
- Hodkinson, B 1987, 'A reappraisal of the archaeological evidence for weaving in early Christian Ireland', *Ulster J of Archaeol* **50**, 47–53.
- Hoffmann, M 1964, *The Warp-Weighted Loom: Robin and Russ Handweavers*, Oslo: Hestholms Boktrykkeri.
- Hunter, J R 1986, *Rescue excavations on the Brough of Birsay 1974–82*, Soc of Antiq of Scot Monogr Ser **4**.
- Hunter, J R 2007, *Investigations in Sanday, Orkney. Volume 1: Excavations at Pool, Sanday. A multi-period settlement from Neolithic to Late Norse times*, Kirkwall: The Orcadian.
- Kaland, S H H 1993, 'The settlement of Westness, Rousay', in C E Batey et al (eds), *The Viking Age in Caithness, Orkney and the North Atlantic*, Edinburgh: Edinburgh University Press, 308–17.
- Kershaw, J F 2009, 'Culture and gender in the Danelaw: Scandinavian and Anglo-Scandinavian brooches', *Viking and Medieval Scandinavia* **5**, 295–325.
- MacGregor, A 1975, 'The Broch of Burrian, North Ronaldsay, Orkney', *Proc Soc Antiq Scot* **105**, 63–118.
- Mårtensson, L, Nosch, M and Andersson Strand, E 2009, 'Shape of things: understanding a loom weight', *Oxford J of Archaeol* **28**:4, 373–98.

- Mårtensson, L, Andersson, E, Nosch, M, Batzer, A 2005–6, Technical Report: Experimental Archaeology Part 1, 2005–2006, <ctr.hum.ku.dk/tools/exreports/> [accessed 20 November 2012].
- Mårtensson, L, Andersson, E, Nosch, M, Batzer, A 2006a, Technical Report: Experimental Archaeology Part 2:1 flax, 2006, <ctr.hum.ku.dk/tools/exreports/> [accessed 20 November 2012].
- Mårtensson, L, Andersson, E, Nosch, M, Batzer, A 2006b, Technical Report: Experimental Archaeology Part 2:2 Whorl or bead? 2006, <ctr.hum.ku.dk/tools/exreports/> [accessed 20 November 2012].
- Mårtensson, L, Andersson, E, Nosch, M, Batzer, A 2007, Technical Report: Experimental Archaeology Part 3 Loom weights, 2007, <ctr.hum.ku.dk/tools/exreports/> [accessed 20 November 2012].
- Milek, K 2012, 'The roles of pit houses and gendered spaces on Viking-age farmsteads in Iceland', *Medieval Archaeol* **56**, 85–130.
- Morris, C D 1996, *The Birsay Bay Project Volume 2, Sites in Birsay Village and on the Brough of Birsay, Orkney*, Durham: University of Durham, Department of Archaeology.
- Morris, C D, Batey, C E and Rackham, D 1995, *Freswick Links, Caithness: excavation and survey of a Norse settlement*, Inverness: North Atlantic Biocultural Organisation Monogr **1**.
- Orkney Heritage Society 1981, *Orkney Heritage Volume 2 — Birsay: A Centre of Political and Ecclesiastical Power*, Kirkwall: Orkney Heritage Society.
- Øye, I 2011, 'Textile-production equipment', in D Skre (ed), *Things From the Town: Artefacts and Inhabitants in Viking-Age Kaupang*, Oslo: Aarhus University Press and the Kaupang Excavation Project, 339–72.
- Owen, O and Dalland, M 1999, *Scar: A Viking Boat Burial on Sanday, Orkney*, East Linton: Tuckwell Press.
- Petty, C 2014, Warp weighted looms: then and now. Anglo-Saxon and Viking archaeological evidence and modern practitioners (unpubl MPhil thesis, University of Manchester).
- Philp, B 2003, *The Discovery and Excavation of Anglo-Saxon Dover*, Dover: Kent Archaeological Rescue Unit.
- Radford, C A R 1959, *The Early Christian and Norse Settlements at Birsay, Orkney*, Edinburgh: HMSO.
- RCAHMS 1946, *Twelfth Report with an Inventory of the Ancient Monuments of Orkney and Shetland*, Edinburgh: HMSO.
- Ritchie, A 1974, 'Pict and Norseman in northern Scotland', *Scott Archaeol Forum* **6**, 23–36.
- Ritchie, A 1977 'Excavation of Pictish and Viking-age farmsteads at Buckquoy, Orkney', *Proc Soc of Antiq of Scot* **108**, 174–227.
- Smith, A N 1995, 'The excavation of Neolithic, Bronze Age and early historic features near Ratho, Edinburgh', *Proc Soc of Antiq of Scot* **125**, 69–138.
- Smith, B 2001, 'The Picts and the martyrs or did Vikings kill the native population of Orkney and Shetland?', *Northern Stud* **36**, 7–32.
- Speed, G and Walton Rogers, P 2004, 'A burial of a Viking woman at Adwick-le-Street, South Yorkshire', *Medieval Archaeol* **48**, 51–90.
- Thorláksson, H 2000, 'The Icelandic Commonwealth Period: building a new society', in W W Fitzhugh and E I Ward (eds), *Vikings: The North Atlantic Saga*, Washington: Smithsonian Books, 175–85.

- Wainwright, F T 1962, 'The Scandinavian settlement', in F T Wainwright (ed), *The Northern Isles*, Edinburgh: Thomas Nelson and Sons, 117–62.
- Walton Rogers, P 1997, *Textile Production at 16–22 Coppergate: The Small Finds*, The Archaeology of York **17/11**.
- Walton Rogers, P 2001, 'The re-appearance of an old Roman loom in medieval England', in P Walton Rogers, L Bender Jørgensen and A Rast-Eicher (eds), *The Roman Textile Industry and its Influence: a Birthday Tribute to John Peter Wild*, Oxford: Oxbow, 158–71.
- Walton Rogers, P 2004, 'Fibres and dyes in Norse textiles', in E Østergård (ed), *Woven into the Earth: Textiles from Norse Greenland*, Aarhus: Aarhus University Press, 79–92.
- Walton Rogers 2007a, *Cloth and Clothing in Early Anglo-Saxon England AD 450–700*, CBA Research Report **145**.
- Walton Rogers, P, 2007b, 'The importance and organisation of textile production', in C Loveluck (ed), *Rural Lifestyles and Social Change in the First Millennium AD: Anglo-Saxon Flixborough in its Wider Context (Excavations at Flixborough 4)*, Oxford: Oxbow, 106–11.

ABBREVIATIONS

HSMO Her Majesty's Stationary Office

RCAHMS Royal Commission on the Ancient and Historical Monuments of Scotland

FIG 1

Map of the study area showing the location of Brough of Birsay, Buckquoy, Howe, Pool, Saevar Howe and Skail. *Cartography by Helen Stirling. © Helen Stirling Maps.*

FIG 2

Diagram showing where measurements of diameter (d), length (l), width (w), thickness (t) and diameter of hole (dh) were taken for the spindle whorls and loomweights.

Drawing by Lindsey Stirling. © L Stirling.

FIG 3

Spindle whorl materials.

(a) Bone, Pool 1191 (b) Clay, Skail 81 (c) Lead, Brough of Birsay 504 (d) Steatite, Pool 2281 (e) Steatite vessel sherd, Pool 4498 (f) Serpentine, Pool 1790 (g) Siltstone, Howe 1865 (h) Jet, Howe 4195 (i) Sandstone, Howe 5270. *Photographs: Lindsey Stirling. © L Stirling.*

FIG 4

Loomweight shapes and materials.

(a) Discoid (round with two flat faces and a central perforation). (b) Pear shaped (oval with one end thinner than the other, two flat or slightly convex faces and the perforation towards the smaller end). (c) Other shapes (these generally had two flat faces and were roughly rectangular or triangular in shape). (d) Unbaked clay, Saevar Howe 49. (e) Baked clay, Skail 5064. (f) Steatite, Brough of Birsay 581. (g) Sandstone, Pool 1665. (h) Sandstone, Pool 1748. (i) Sandstone, Pool 6313. *Drawings and photographs: Lindsey Stirling. © L Stirling.*

FIG 5

Spindle whorl shapes.

(a) Hemispherical (hemispherical top with either a flat or rounded base), Pool 1802. (b) Flat (two flat faces with rounded or straight sides), Howe 4540. (c) Conical (angled sides with a flat base and sometimes a flattened top), Pool 1776. (d) Biconical (hemispherical upper and lower faces), Howe, 5341. (e) Spherical (ball shaped), Pool 5794. (f) Femur head (made from the femur head of an animal bone, generally hemispherical in shape), Skail 1052. (g) Irregular (other shapes), Howe, 7268. *Drawings and photographs*: Lindsey Stirling. © L Stirling.

FIG 6

Graph showing the weights of spindle whorls through time. © L Stirling.

FIG 7

The decorated spindle whorls.

(a) Ogham inscription, Buckquoy 84. (b–d) Incised lines at right angles to the perforation, Buckquoy 86, Pool 4953 and Skail 1059 respectively. (e–f) Pits and incised lines, Pool 1206 and 4947 respectively. (g–h) Incised concentric rings, Pool 1340 and 2961 respectively. *Photographs: a–b, Tankerness House Museum, © Tankerness House Museum. c–h, Lindsey Stirling. © L Stirling.*

FIG 8

Graph showing the weights of loomweights through time. © L Stirling.

FIG 9

Other artefact types.

(a) Pin beater, Pool 10. (b) Long handled comb, Pool 5249. (c) Needle case, Pool 146. (d) Bobbin, Howe 3671. (e) Needle, Pool 1894. *Photographs: Lindsey Stirling. © L Stirling.*

FIG 10

Evidence of textile production from the six sites showing the range of artefact types, materials and styles from the early Iron Age to the late Viking Age. *Drawing by Lindsey Stirling. © L Stirling.*

TAB 1

The date groups and phasing of the six sites.

TAB 2

Spindle whorl material, preservation and shape.

TAB 3

Spindle whorls by site and date.

TAB 4

The decorated spindle whorls.

TAB 5

Loomweight material, preservation and shape.

TAB 6

Loomweights by site and date.

TAB 7

The long handled combs material and date.

TAB 8

The bobbins.

TAB 9

Needles by site and date.

TAB 10

The needle cases.

¹ Department of Archaeology, School of Geosciences, University of Aberdeen, St Mary's, Elphinstone Road, Aberdeen AB24 3UF, Scotland, UK. lindsey.stirling.09@aberdeen.ac.uk

² Department of Archaeology, School of Geosciences, University of Aberdeen, St Mary's, Elphinstone Road, Aberdeen AB24 3UF, Scotland, UK. k.milek@abdn.ac.uk

³ Eg Wainwright 1962; Ritchie 1974; Crawford 1981; Crawford 1987; Smith 2001; Bäcklund 2001; Barrett 2003; 2004.

⁴ Andersson Strand et al 2010.

⁵ Eg Gabra-Sanders 1998.

⁶ Eg Smith 1995; Walton Rogers 1997; Fitzgerald 2000; Walton Rogers 2001; Andersson 2003; Speed and Walton Rogers 2004; Walton Rogers 2007a; 2007b; Øye 2011.

⁷ Mårtensson et al 2005–6, 5; Walton Rogers 2004.

⁸ Walton Rogers 1997, 1721–7.

⁹ Walton Rogers 1997, 1745.

¹⁰ Hodkinson 1987; Fitzgerald 2000; Walton Rogers 2001.

¹¹ Hoffmann 1964, 5.

¹² Andersson 2003, 27.

¹³ Ibid, 32–3.

¹⁴ Mårtensson et al 2009; Mårtensson et al 2005–6; 2006a; 2006b; 2007.

¹⁵ Andersson 2003; Øye 2011.

¹⁶ Eg Walton Rogers 1997; Smith 1995; Speed and Walton Rogers 2004.

¹⁷ Walton Rogers 1997, 1821.

¹⁸ Ibid, 1821–2.

¹⁹ Graham-Campbell and Batey 1998; Owen and Dalland 1999.

²⁰ Ashby 2009.

²¹ RCAHMS 1946; Cruden 1958; 1965; Radford 1959; Curle 1982; Hunter 1986; Morris 1996.

²² Ritchie 1977; Brundle et al 2003.

²³ Ballin Smith 1994.

-
- ²⁴ Hunter 2007.
- ²⁵ Hedges 1983.
- ²⁶ Buteux 1997.
- ²⁷ Mårtensson et al 2009; Mårtensson et al 2005–6; 2006a; 2006b; 2007.
- ²⁸ Ballin Smith 1994, 192; Mårtensson et al 2006b.
- ²⁹ Ballin Smith 1994, 192; Philp 2003, pl 3.
- ³⁰ Hoffmann 1964.
- ³¹ Henshall 1950, 146; MacGregor 1975, 84.
- ³² Henry 1998, 159; Walton Rogers 1997, 1760; 2001.
- ³³ Fitzgerald 2000, 124.
- ³⁴ Ballin Smith 1994, 171; Walton Rogers 1997, 1785.
- ³⁵ Hunter 2007, 501–3.
- ³⁶ Ballin Smith 1994, 171.
- ³⁷ MacGregor 1975; Hedges 1987.
- ³⁸ Andersson 2003; Øye 2011.
- ³⁹ Ballin Smith 1994.
- ⁴⁰ Øye 2011.
- ⁴¹ Andersson 2003, 25.
- ⁴² Øye 2011, 368.
- ⁴³ Mårtensson et al 2006a, 12.
- ⁴⁴ Øye 2011, 345.
- ⁴⁵ Forsyth 1995.
- ⁴⁶ Hedges 1983, 31–4.
- ⁴⁷ Eg Broch of Gurness (Hedges 1987). Note also the depiction of an upright loom on a 9th- or 10th-century Pictish cross slab, Kirriemuir Stone No. 1, carved in Angus just at the cusp of the Viking settlement in Orkney, which is usually interpreted as a warp-weighted loom in a Pictish context (RCAHMS, Canmore Item SC 1096878; Petty 2014, 24, 33). Although weathering of the sculpted stone makes it difficult to distinguish loomweights, the shed is shown in the mid-lower part of the loom and the completed woven fabric is depicted at the top of the loom in interlace, supported on its lower end by what appears to be a weaving sword.
- ⁴⁸ Eg Walton Rogers 1997, 1753; Andersson 2003; Walton Rogers 2007b, 107.
- ⁴⁹ Mårtensson et al 2009, 392–3.
- ⁵⁰ Øye 2011; Andersson 2003.
- ⁵¹ Mårtensson et al 2009.
- ⁵² Hunter 2007.
- ⁵³ Morris et al 1995, 130.
- ⁵⁴ Ballin Smith 1994, 171; Andersson 2003, 86.
- ⁵⁵ Hunter 2007, 501–2.
- ⁵⁶ Andersson 2003, 89.
- ⁵⁷ Andersson Strand 2011, 3.
- ⁵⁸ Øye 2011, 345.
- ⁵⁹ Cruden 1965; Orkney Heritage Society 1981.
- ⁶⁰ Thorláksson 2000, 185.
- ⁶¹ Gerrard et al 2010; Hamilton 1956; Crawford and Ballin Smith 1999; Batey 1987; Morris et al 1995.
- ⁶² Øye 2011, 344.

-
- ⁶³ Gerrard et al 2010; Hamilton 1956.
- ⁶⁴ Øye 2011, 343–45.
- ⁶⁵ Andersson 2003; Øye 2011.
- ⁶⁶ MacGregor 1975; Hedges 1987.
- ⁶⁷ Walton Rogers 1997, 1786.
- ⁶⁸ Hunter 2007, 501–3.
- ⁶⁹ Walton Rogers 2001.
- ⁷⁰ Hedges 1987; Fitzgerald 2000, 124.
- ⁷¹ Morris et al 1995; Hamilton 1956.
- ⁷² Owen and Dalland 1999.
- ⁷³ Walton Rogers 2001.
- ⁷⁴ Abrams 2012, 22.
- ⁷⁵ Kershaw 2009, 308.
- ⁷⁶ Eg Hedenstierna-Jonson 2006.
- ⁷⁷ Eg Wainwright 1962; Crawford 1981; Smith 2001.
- ⁷⁸ See Milek 2012 and the reference contained therein for a discussion of the evidence that associates women with textile production.
- ⁷⁹ Helgason et al 2001; Graham-Campbell and Batey 1998.
- ⁸⁰ Walton Rogers 1997.
- ⁸¹ Kaland 1993.