Textile appearance and visual impression – Craft knowledge applied to archaeological textiles

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Introduction

This paper presents the result of the collaboration between a hand weaver and a medieval archaeologist. Our study is founded in the weaver's craft knowledge. We find that applying handicraft knowledge to archaeological textiles allows a more refined description of each fabric. Studying appearance and visual impression of the textiles makes it possible to take a more holistic approach to archaeological textiles that goes beyond and complements the standard technical analysis[1]. It also makes it possible to translate craft knowledge into an academic format and thus assist in closing the gap between practical and theoretical knowledge. The textiles from the medieval town of Lödöse in Sweden are employed as a case study.

A textile is defined not only by the technical data of weave, thread count and twist direction but also by the appearance of the textile. Differences clearly visible to the naked eye are not discernible through the standard analysis of archaeological textiles. Textiles contain a fourth dimension – appearance and visual impression – that eludes the established recording system[2]. Lodged in handicraft knowledge, this turns craftsmanship into an important tool to understand archaeological textiles.

Many of the first generation of textile scholars were educated craftspeople and used their craft knowledge in their work – but often unconsciously. Much handicraft knowledge is tacit and the background of the early researchers' works consequently scantly verbalised. The next generation consisted of academics, archaeologists or scientists, e.g. conservators, who did not inherit handicraft knowledge[3]. In the last decade consciousness of handicraft as a form of knowledge, has increased, and craft education is entering the academic field. This includes collaboration between archaeologists and textile craftspeople and has raised fundamental questions as to how raw materials and technology interact and affect textiles' properties[4].

The Pentagon model – an Overall View (LH)

The Pentagon model was established to facilitate and broaden comparison within or between different bodies of textile material. The basis is to *see and treat* the textile as an entirety, as finished fabric, as well as to review the production processes involved. It is an attempt to grasp the complexity and interaction of all the factors that co-operate in the creation of a fabric. The Pentagon was developed during combined theoretical and practical work with the textiles from *Mons Claudianus*, Roman Egypt[5].

Yarn: A continuous strand, single or compound, made from any fibre or filament by reeling, spinning, twisting, or throwing[6]. Yarn properties can be divided into two groups, those that originate from the fibre itself and those that originate from the spinning process[7].

Weave or Binding: The system of interlacing threads of warp and weft according to defined rules in order to produce all or parts of a textile[8].

Thread count or Set: The number of threads in warp and weft per unit of measure[9].

Weaving: The effect of the interplay between the loom, the weaving tools, and how the weaver works.

Finishing: finishing processes are performed on the web when taken off the loom. Finishing can include wetting, stretching, application of dye, fulling the fabric, or a combination of these processes[10].

Two other phenomena: *variability in thread spacing* and *movement*. These are each the result of the interplay of several factors within the Pentagon and therefore not included in the five basic factors of the model. *Variability in spacing* is primarily assigned to *weaving* in the Pentagon model, but fabric density, a combination of yarn diameter, thread count, and weave, can also affect it[11]. *Movement* is primarily assigned to *yarn* in the Pentagon but fabric density can also affect it.

Medieval Lödöse and its Textiles

Lödöse is situated in the west of Sweden by the river Göta Älv, about 40 km north of Gothenburg. Lödöse was the only Swedish port to the west. The county of Bohuslän then belonged to Norway, that of Halland to Denmark (Fig. 1). Lödöse was of great importance to the Swedish kingdom and a very important centre for both export and import. Lödöse began to grow as a mercantile and trading town during the early medieval period and in the 13th century it featured a royal castle, a mint, three churches and a Dominican monastery. During the 14th century a local Hanseatic storage centre was established and trade contacts with Western Europe were strengthened. Around 1300 the town was at its peak, with about 1500 inhabitants of several nationalities including a good number of skilled craftsmen. Prob-

lems with the Customs Authorities further south down the river made trading difficult during the 15th century and the town was eventually relocated by Royal decree. A new town was founded in 1473 and took the name New Lödöse. The area is now known as the 'Old Town' of the present Gothenburg[12].

Preservation conditions in Lödöse are generally very good, which makes the finds rich and comprehensive. Organic materials are less well preserved in the layers from the late medieval period. It is in the earlier layers, therefore dated around 1100–1350, that textiles are found. About 1700 textile samples have been recorded, most of them made of wool, but there are also some made of goat-hair and flax. 2/1 twill is the most common weave and textiles woven with a single spun yarn, z-twist in the warp and s-twist in the weft predominates. Different textile tools have been also been found. Among them are about 250 spindle-whorls of varying weight and material and also wooden spindles. There are indirect traces of looms, both the warp-weighted and the horizontal treadle loom. Associated with the warp-weighted loom are sword-beaters, one in whalebone and some in wood, and a lot of objects that might have been used as weights. Associated with the treadle loom are one shuttle and one pulley. There are also two possible warping paddles and sewing equipment such as needles and scissors. Trading at Lödöse was strongly orientated toward Western Europe. About ten lead seals have been found, indicating import of cloth. Two seals can be identified from Tournai and Ypres in Flanders[13].

This study includes textiles from two excavations, site C, with 191 fragments, and site GD, with 77 fragments, a total of 268 textiles. The excavations are on the whole representative of all the Lödöse textiles. Among the textiles are the same types that can be recognised in other medieval finds in Europe[14].

Technical data on the Textiles

Weave: 2/1-twill is the most common weave with 74% of the textiles. The secondmost common weave is 2/2-twill with 10%. Tabby weave and 2/1-twill with variations make up 8.5% and 2% respectively. The 2/1-twills with variations are self-patterned textiles, e.g. lozenge twill.

Twist direction: 90% of the textiles have a z/s combination in twist direction. Only 3% have a z/z combination. 5% have 2-ply yarn.

Thread count: Fig. 2 shows thread count and ratio. The lowest thread count among the textiles is c. 2/2 threads/cm and the highest is 30/16 threads/cm. Most of the textiles range from

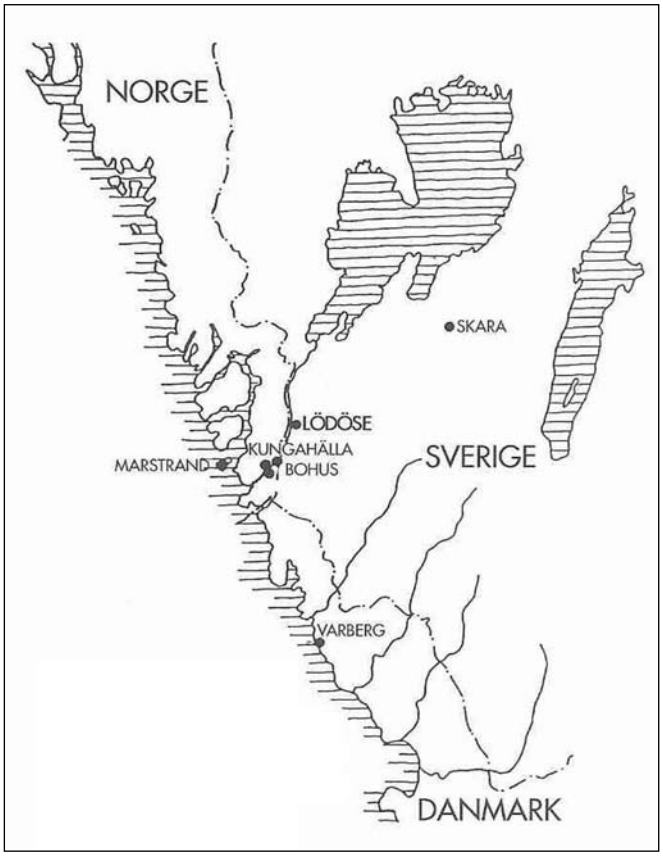

Fig.1. Map showing the western part of Sweden with Lödöse between the Danes to the south and the Norwegians to the north. After Carlsson 1998.

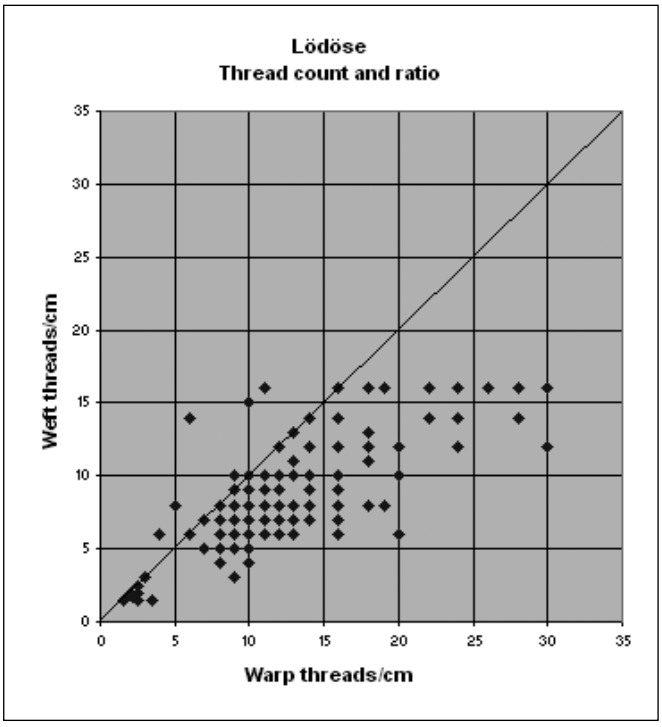

Fig. 2. The distribution of thread count and ratio. The line marks the warp/weft ratio 1:1. N=268.

having the same thread count in warp and weft to having twice as many warp threads as weft threads; a higher ratio is uncommon. Textiles with more weft- than warp threads/cm are very unusual.

Established Textile Groups

A number of Lödöse textile groups can be recognised from studies of contemporary textiles in Northern Europe. The first group consists of *pleated textiles*, a type that is well known from Oslo, Bergen, Trondheim and Lund in the same period[15]. They can be described as smooth, with a hard appearance and are now dark brown or brownish black. The weave is 2/1-twill and 2/1-twill with the self-patterned variation. The twist direction is z/s, but some with z/z. The textiles in this group have the highest thread count, often with almost twice as many warp threads as weft threads. Another group is *hard felted textiles*. Some fragments are just small off-cuts, but on many of them colours such as red and green can be detected. Really coarse textiles are not so common in the group. *Textiles with a woolly surface* are a third group. Their surface looks slightly felted. They differ in colour from the «common brownish» and can be described as yellowish- or greenish-brown. Among these are also striped textiles, some with re-grouped warp threads; most common colour of the stripes is red. Most of the tabby textiles can be described as *coarse tabby textiles* and are often interpreted as textiles used in transportation or packing. Very often they have 2-ply yarn. This group is very well described and documented by Susan Möller-Wiering (1998, 2002). The majority of the Lödöse twill textiles, however, cannot be placed in any of these groups. Instead, they may be described as *common or ordinary textiles*. These fabrics are 2/1- or 2/2-twills, with z-spun warp, s-spun weft and in a variety of brownish colours.

Fig. 3. Example of prominent, curving diagonal lines. Lödöse C 274. Photo: Katherine Vestergaard Pedersen.

Although several groups can be observed visually, neither these groups nor the differences between them can be described by the standard methodology of the textile archaeologist. To do this, the Pentagon model and the concepts of appearance and visual impression have been employed.

Textile appearance and visual impression: Characterisation and phenomena – An example using twills from Lödöse

With reference to the textiles' appearance and visual impression three main categories were defined, designated: textiles with «Visible weave», with «Invisible weave» and «Indistinct weave». The characteristic of textiles with «Visible weave» is that the weave or binding is easy to recognise immediately as a tabby, 2/1 twill, 2/2 twill etc. The characteristic of textiles with «Invisible weave» is that the weave structure is concealed by fibres on the surface. The characterisation of textiles with «Indistinct weave» is that the weave structure is hard to recognise, and to be identified, requires a careful consideration or a regular weave analysis. The threads in the textile are however noticeable. These three main categories have then been examined in detail, to get information about the specific factors that form the basis of the characterisation of each group.

«Visible weave»

For the twill textiles with «Visible weave» the prominence of the diagonal lines has proved to be one factor. Twist direction in the

Fig. 4. Pleated textile with «indistinct weave». Lödöse DC 3417A. Photo: Katherine Vestergaard Pedersen.

yarn, s or z, in combination with S or Z twill diagonal, creat more or less prominent or distinct lines. For 2/2 twill, a reversible weave, twill lines have a S slant on one side and Z on the other, and consequently the lines will be more prominent on one side, less on the other[16]. For 2/1 twill, a non-reversible weave, the surface texture is different on the two sides. Warp threads predominate on one side, weft threads on the other. In general, the diagonal lines are more prominent on the warp-faced side.

Of further importance for the twill's appearance is whether the diagonal lines are straight or curving. Straight lines may be due to dense sett in the loom or because the fabric has been woven on a loom with a reed. Curving lines may derive from a more open sett and/or a loosely beaten weft. This allows high shrinking in the finishing process, and causes the warp threads to move and form curves. Another possible explanation to curving lines may be that the fabric was woven on a loom *without* a reed, allowing the warp-threads to move sideways during weaving.

A final factor influencing textile appearance is whether the eye perceives the warp threads, the weft threads, or a combination of both, as creating diagonal lines.

Fig. 3 shows a fabric with prominent, curving lines. The prominence of the twill lines is emphasised by the thin, dark warp in combination with the coarser, lighter weft. The textile has probably been woven with an open spaced weft, allowing shrinking in the fabric's warp-direction, and causing the warp threads to become distinct.

«Invisible weave»

Factors that indicate whether a textile fits into «Invisible weave» are the fibre quantity and its form on the surface. The surface can be either entirely covered with an entangled web of fibres (felted) or covered with detached fibres (with a nap).

«Indistinct weave»

For twill textiles in the «Indistinct weave» category defining features have proved to be more elusive and hard to understand and explain. In thinner textiles, the slant of the twill lines can disturb the weave structure. Very flat or steep diagonal lines will merge with the horizontal or vertical threads and give an «indistinct weave». This phenomenon is only seen in the thinner textiles, because the yarn outline in coarser textiles is so distinct that the weave structure will be recognised. Fig. 4 shows a pleated textile with steep diagonal lines. In the pleated group we also find examples where the diagonal lines are distinct, giving a «visible weave».

Irregularities in thread systems can also disturb the weave structure. Irregularities occur when warp and/or weft threads have a variable spacing. Variability in thread spacing can be observed, as more or less regular sections of more open and denser areas in the warp and/or the weft. This phenomenon may occur on looms without a reed. Where the warp threads have more open areas the weft may be more easily beaten in, and in the more dense areas it is harder to beat in the weft. Fig. 5 shows a textile woven on the warp-weighted loom, with variability in thread spacing. The photo shows the phenomenon in its extreme.

Yarn movement in a textile can also create a disturbed weave structure. It affects the surface texture in different ways, and can be seen as either a two-dimensional or a three-dimensional movement. A well-known example is crepe fabric. Yarn movement can be described as an undulating movement in the yarn, primarily caused by yarn torsion, but friction and thread density also contribute. The fibres' resistance to being twisted causes torsion, which works counter to the spin direction. The yarn will rise where it floats, making bubbles or humps. In a more open spaced textile, the bubbles may fall sideways, and this movement

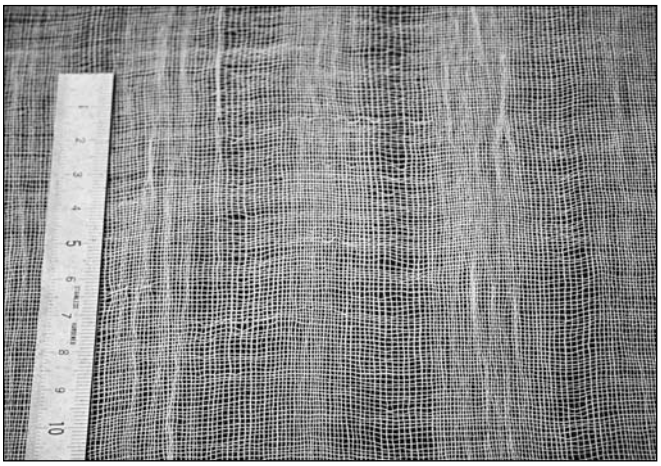

Fig. 5. Test weave made by Lena Hammerlund. Photo: Katherine Vestergaard Pedersen.

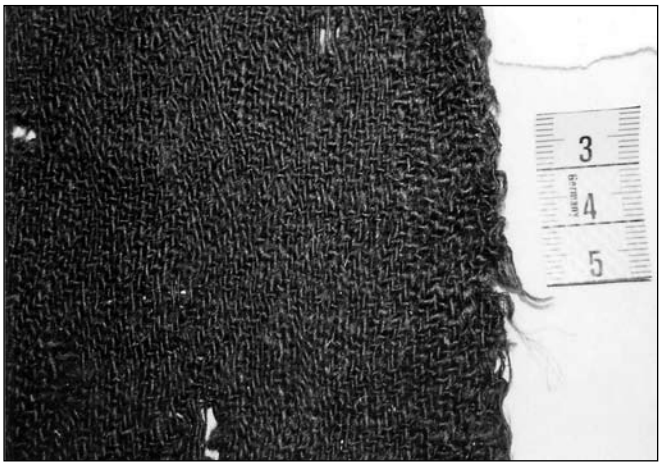

Fig. 6. Example of yarn movement. Lödöse C254. Photo: Katherinae Verstergaard Pedersen.

is seen as two-dimensional. In a denser textile the bubbles will stay elevated, going up and down, and this movement is seen as three-dimensional. This phenomenon creates different appearance for different weaves/bindings. Fig. 6 shows a «common» textile with two-dimensional yarn movement.

Supplementary characterising features

Some characterising features that can be used to supplement to the above mentioned are:

Visible perceived thickness and density. This can be a more or less rough assessment according to the purpose of the study. Thickness can be described with words such as very fine, fine, medium, coarse and very coarse. Together with thickness, it is valuable to note perceived density[17]. For the Lödöse textiles three gradations are relevant: open, normal or medium and dense.

Furthermore, the notions *smooth, woolly* and *hairy* can be used both for surface texture and for the yarn. For a *textile* a smooth appearance means that no fibre ends can be seen on the surface. Sometime these textiles give a feeling of stiffness. On a woolly fabric, fibre ends can be seen on the surface, and may be slightly entangled. These textiles convey a sense of softness and the fibres a sense of fineness. On a hairy fabric, fibre ends are also seen on the surface but instead these textiles convey a sense of hardness and stiffness. The fibres are seldom entangled and look coarse. For the *yarn* «smooth», «woolly» and «hairy» can be used to describe and differentiate warp and weft yarn in a textile. The warp yarn, e.g., may be described as «smooth», the weft yarn as «woolly», or the description can be, just «hairy» when both the warp and weft yarn looks the same.

Conclusion

Through traditional working method groups such as pleated, hard felted, and textiles with a woolly slightly felted surface could be distinguished. To this can be added the great majority of the Lödöse textiles, described only as «common or ordinary». Among these, and particularly among the latter group, several visual groups were observed. By focusing on their appearance and visual impression, it proved possible to define these, adding to the range of specific fabric types. Using handicraft knowledge, we were thus able to divide and describe the «common or ordinary» group more in detail. Particular attention has been paid to the twill lines; to their different «ways of looking and being», and to how much this affects a fabric's appearance. We have also got clues as to what type of loom some of the textiles may have been woven on, e.g. textiles with curving diagonal lines and textiles with variability in thread spacing.

The work presented here now continues in a Network Project funded by the Nordic Culture Fund. It was established to further develop and adapt the idea of «appearance and visual impression» to Nordic medieval textiles. The project team consists of the authors of this paper, together with Marianne Vedeler from Norway, and Heini Kirjavainen from Finland. Vedeler and Kirjavainen work with medieval textiles but with different specialities, dress and clothing and fibres respectively. The project works on textiles from Lödöse in Sweden, Tønsberg in Norway and Turku in Finland.

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