

Loom-woven textiles

H Bennett, P Z Dransart and the late N Q Bogdan

Fibres

Of the 318 samples of loom-woven textiles, all but 13 appear to be of wool or hair. Twelve of the exceptions are silk. The thirteenth, Cat No 403/A11083, a piece of carpet, has a base of jute or sisal, but is certainly modern (see Carpet, below). From the remaining 305 cloths a number were selected at random for fibre analysis, and generally samples were taken from both warp and weft. As expected, most were found to be sheep's wool, but the fibres of two exceptionally coarse textiles, Cat Nos 63/A9993a and 64/A9993b, were identified as goat hair. Full details are given in Dr Ryder's report below. It may also be mentioned that one of the leather shoes proved to have been sewn with cow hair, and another with cow or goat hair (see The leatherwork, this fascicule), and that two of the non-woven textiles, Cat Nos 15/A11080c and 174/A09-0141, are probably made of horse hair (see Yarns and cords, below).

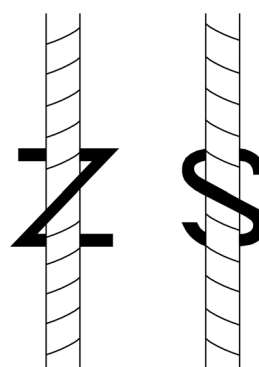
Like wool and animal hair, silk is a protein fibre. However, if it is to be produced on a large scale, special conditions are required. Silk is actually a very long filament secreted in two parallel strands by pupating silkworms. These silkworm chrysalids also secrete a substance known as sericin, which gums the strands together as the cocoon is formed. In order to unreel a cocoon, the chrysalid must be killed to prevent the secretion of another substance which would dissolve the sericin and damage the silk strands. Reeled silk is still hard when wound off the cocoon, although it may be woven in such a condition. On removing the sericin, by washing either the yarn or the woven fabric in warm water, the silk is both soft and shiny. In the wild, silkworm larvae emerge as silkmooths, breaking through the cocoon. The broken sections of silk filament may be carded and spun like wool, and the final product is termed 'spun' or 'wild' silk. However, the production of 'cultivated' silk involves using domesticated silkworms, the most important of which is *Bombyx mori*, which feeds on the leaves of cultivated 'white' mulberry trees. Sericulture (silk production) and silk weaving were first undertaken in China, where the reeling of silk has been practised for at least 4,600 years (for further information, see Geijer 1979, 4-6 and chapter VII).

With the exception of the modern piece mentioned above, and possible fragments of linen, caught in a seam on one of the silks (Cat No 346/A09-0044), there is a total absence of bast fibres. This is not unexpected, for the damp, acid conditions which have allowed the survival of the wools and silks are much less favourable

to the products of flax, hemp and the like. That such products were available in Scotland during the period under consideration, if only to a limited extent, is not in doubt (see General discussion, below). Indeed the presence on some samples of seam lines and needle holes but without traces of sewing yarn, strongly suggests the use of linen thread, or similar, which has proved more susceptible to the conditions in which the fabrics were buried.

Spinning

Yarn is described as Z or S spun; this convention indicates whether the twist of the constituent fibres follows the direction of the central bar of the letter Z, or that of the letter S (Illus 2). If a yarn is then plied (twisted together) with one or more others, it is usually twisted in the opposite direction to that in which it was spun – thus, for example, Z spun yarns are plied together in S direction. In most of the cloths single thicknesses alone have been used, but in one group, consisting of 53 samples of coarse tabby, 2 ply yarns have been used throughout; in one sample only, Cat No 157/A8366, 2 ply yarn (in the warp) and single ply (in the weft) are combined. Among the 251 woollen cloths made entirely from single ply yarns, the majority are either Z spun in both systems (81), or Z spun in one and S spun in the other (164). In the latter group the Z spun yarn, which tends to be the normal product of



Illus 2 Z and S directions of spinning.

a right-handed person spinning with a spindle (Illus 3 and 4), is often of better quality, more firmly spun and evenly made. Further, where the existence of a selvedge allows warp and weft to be identified, the Z spun yarn is generally the warp; it also tends to have the higher count – that is, the density of threads per unit measurement, which in part determines the quality of the cloth. The use of Z and S yarn together in one system is unusual, and is found here in only four fabrics – Cat Nos 93/A10193c (Illus 9), 168/A9057a, 259/A09–0104 (Illus 38) and 337/A09–0041 (Illus 37).

On medieval sites elsewhere it has been noted that cloths made solely from S spun singles, although popular earlier and later, are rare among 12th- and 13th-century material (Endrei 1968, 19; Lindström 1982, 182). Only one textile, a 2/1 twill, is listed with S spun warp and weft from 12th- and 13th-century contexts in London (Crowfoot et al 1992, 27). The High Street site has produced just two – Cat Nos 142/A9536b and 204/A09–0133a (Illus 21). It might be argued that Cat No 204/A09–0133a represents a selvedge, all that remains of a larger fabric, in which case the rest of the textile might not have been woven from S spun warp. This would still leave Cat No 142/A9536b, which dates from the late 12th century, unexplained. It is a 2/1 twill, as is Catalogue No 15 from Kirk Close, Perth, probably dating from the 14th century (Bennett 1987, 164). A further 2/1 twill with S spinning throughout should be noted from 30–46 Upperkirkgate, Aberdeen, but it belongs to the 15th century (Gabra-Sanders 2001a, 232). Textiles with S spun warp and weft predominated at Fast Castle, Berwickshire, in the second half of the 15th century, but these were all woven in tabby (Ryder and Gabra-Sanders 1992, 8; Gabra-Sanders and Ryder 2001, 126). In addition, S spinning in warp and weft prevailed over other combinations amongst the 15th- and 16th- century textiles excavated from the Castle Ditch, Newcastle upon Tyne; several weave types were present, but the 2/1 binding was absent (Walton 1981, 193). In sum, it may be stated that although they are rare, post-11th-century and pre-15th-century textiles with S spinning throughout are sometimes present on archaeological sites. It may be suggested that some of these textiles were quite unusual, such as the high quality, light weight 2/2 cloth from a 13th-century pit in the Queen Street Midden Area, Aberdeen (Catalogue No 155 in Bennett 1982, 199). It should also be noted that the 2/1 fabric with an added unspun pile from Lund has S spinning in both warp and weft (Lindström 1982, 182).

There is plentiful evidence that yarn was being prepared on the site throughout the period under discussion. Two wooden spindles have survived (see Fascicule 2, The wood), as have 41 whorls which were used to weight spindles. The whorls, in wood, bone and stone, vary considerably in weight, suggesting that a range of different thicknesses of yarn was being produced.



Illus 3 Eve spinning with a spindle. Detail from the Hunterian Psalter, Glasgow University Library, MS Hunter 229 (U.3.2), folio 8r. (Bridgman Art Library)



Illus 4 Eve spinning with a spindle, from the Taymouth Hours, f.23v (British Library, Yates Thompson 13). (© The British Library Board)



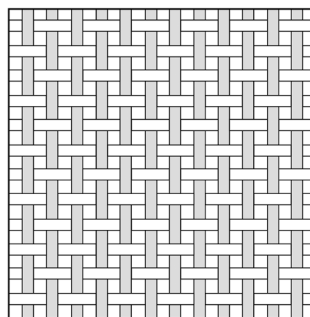
Illus 5 Spinning and carding wool, from the Luttrell Psalter, East Anglia c1335–40 (British Library, Add 42130 f.193). (© The British Library Board)

There is, however, no means of knowing whether this activity was associated with the professional cloth industry in the burgh (see General discussion below), or was purely for domestic purposes. During the Middle Ages an additional method of spinning was introduced, namely, the wheel. This was the spindle wheel, later known in Scotland as the muckle wheel to distinguish it from the newer and smaller flyer wheel. The spindle wheel was in use in England by the 1330s (Illus 5), but how soon it was adopted in Scotland is uncertain. References to the spindle wheel are difficult to trace in Scottish documents before the 16th century, and as yet no parts of spinning wheels have been recognised on medieval sites. Nor may anything be deduced from the High Street cloths – unless, that is, the somewhat irregular and lumpy S spun noted in the ZS twills may be taken as an indication of experiments with the new method of spinning. Carole Morris identified a component of a spindle wheel, a wooden drive-whorl, amongst material from a layer dated to the 17th century at 16–22 Coppergate, York (Walton Rogers 1997, 1745, Catalogue No 6650).

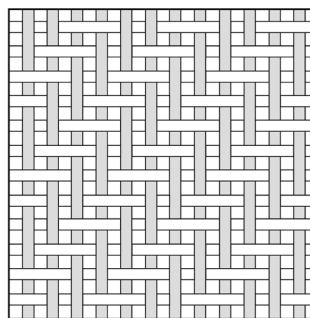
Wool yarn is normally designated worsted or woollen, according to the manner in which it has been prepared. For worsteds, the fibres are laid parallel before spinning, generally by combing. The result is a smooth, often firm and lustrous thread; a cloth woven from worsted yarn is characteristically hard to the touch, and the pattern of the weave is clearly visible. For woollens, the fibres are worked into a loose, airy mass with the aid of pairs of hand cards – flat wooden tools with fine metal hooks set in the faces (Illus 5). This process results in yarns which are softer and fluffier than the worsted, and the made-up cloth is less crisp in appearance. It is particularly suitable for use where the surface of the cloth is to be napped (see Finishing, below), a popular treatment during the medieval period. However, there is virtually no evidence for hand cards in Scotland until 1349, when a ship was seized on its way to Scotland from France, where cards with metal teeth have been made since the 13th century. Wool carding combs were one of the items listed in a varied cargo on board the ship (CDS, iv, no 462). Combs and cards are both mentioned in the Black Book of Taymouth; in an inventory of 1600 of the ‘woman hours’ at Finlarg, four pairs of old ‘stok cardis’ and two pairs of wool combs or ‘woll kaims’ were listed (Grierson 1985, 6).

Weaves and patterns

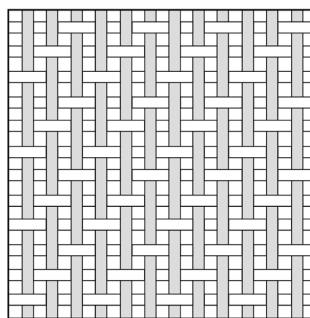
Each of the 305 cloths of wool or other animal hair is constructed in one of three basic weaves: tabby, 2/2 twill and 2/1 twill. On some medieval sites (eg Kjellberg 1979, 84–5) tabby – the simplest of all weaves, in which each warp passes alternately over one weft and under the next (Illus 6, 16) – predominates. Here, though, with 59 examples (19.34%), it occupies a secondary place. The remaining fabrics are all twills,



Illus 6 *Tabby weave.*



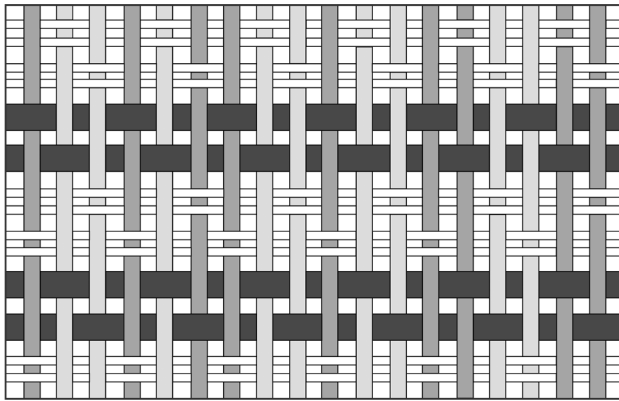
Illus 7 *2/2 twill.*



Illus 8 *2/1 twill.*

that is, each warp passes over two or more weft threads and under the next one or more, or under two or more weft threads and over the next one or more; the binding points are moved one thread sideways on each successive throw of weft, forming the diagonal lines which are a distinctive feature of twill weaves. Thirty-four of the cloths (11.14%) are in 2/2 twill – in which each warp passes alternately over two weft threads and under two (Illus 7). By far the largest number of fabrics, 212 (69.5%), are 2/1 twills. Here, each warp passes over two weft threads and under one (Illus 8). This weave is not reversible, of course, and viewed from the other side the warp ends are seen to travel under two weft threads and over one – in which case it is described as 1/2 twill. When dealing with an excavated fragment, however, it is often difficult to determine which surface was intended to be the main face, so, for convenience, all examples of this structure are described here as 2/1 twill.

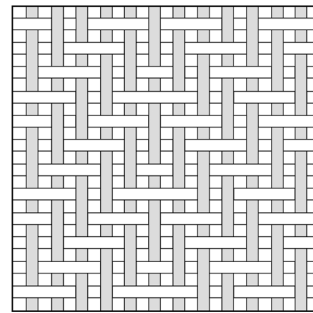
As is common among medieval material, plain cloths are in the large majority. There is a marked shortage both of patterned twills prominent during the Viking period, and of the checks familiar from post-medieval Scotland, and only twelve of the fabrics show any



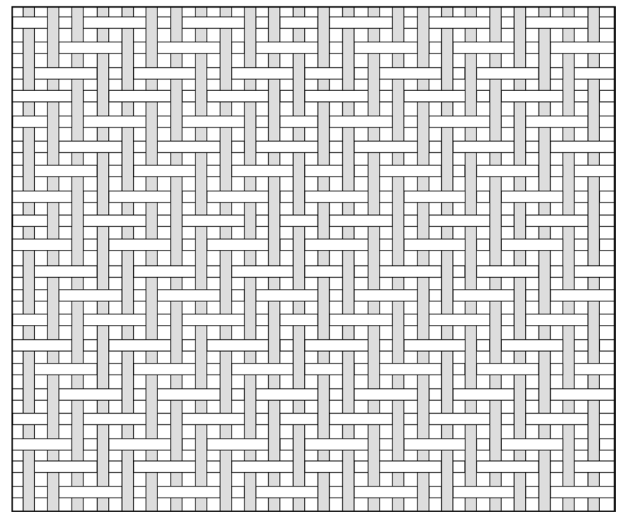
Illus 9 2/1 twill with checked pattern, incorporating yarns of different weight and colour. Cat No 93/A10193c.

deliberate variation in weave, colour or yarn. Four are extended weaves, that is, some elements are duplicated and consist of two threads running side-by-side in the same course; in all four cases this duplication is found in one system only. In Cat Nos 204/A09–0133a, a warp-faced tabby with a weft-wise rib (Illus 21), and 157/A8366, a heavily napped fabric, probably 2/1 twill, the weft threads are paired, while in Cat No 168/A9057a, a heavy weight 2/1 twill (Illus 39), each pair in one system, again probably the weft, consists of one Z spun and one S spun thread; in the fourth sample, Cat No 93/A10193c (Illus 9), the weave is only partially extended, two pairs of threads alternating with two single threads. This last is also notable as the only example of a check in Scotland between the Falkirk piece of the mid-third century AD and those from a burial of c1600 from Dava Moor, Moray (Henshall 1952, 8, 21–4). A 2/1 twill, it might be termed a fancy weave, for it incorporates yarns of different thicknesses as well as of different colours (unlike tartan, it may be noted, which is usually manufactured from yarns of the same weight, and for which the classic weave is 2/2 twill).

Three other samples make use of yarns of different colours. Cat No 20/A12340c, a tabby (Illus 22), is striped in one system, probably the warp. A 2/1 twill (Cat No 22/A12340e) has an irregular banded effect in system 2, achieved by alternating a light beige colour with either mid brown or dark brown. The striping is most conspicuous on the face of the fabric in which these coloured threads float, but the clarity of the design would have been obscured by the raising of the nap. In Cat No 82/A12553b, a 2/2 twill identified as *vaðmal* (Illus 31), the diagonal lines of the weave have been emphasised by combining a dark warp with a pale weft. Cat No 283/A09–0077b, a 2/1 twill in very poor condition (Illus 42), may have been a weft-striped fabric: in this case the bands would have been formed by using a finer yarn than that used for the ground; it is no longer apparent whether this yarn was originally of a different colour. In Cat No 259/A09–0104 (Illus 38), an unfilled 2/1 twill, a change in texture has been achieved simply by substituting a yarn spun in the opposite direction: thus, in one system a block of Z spun threads is followed by a block of threads of



Illus 10 2/2 twill with reverse. Cat No 104/A9975.



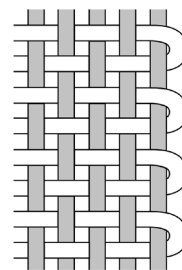
Illus 11 2/2 diamond twill. Cat No 18/A12340a.

similar weight, but S spun. Insufficient of the fabric remains to show whether this spinning pattern was repeated. Among the large number of twills present there are only three, all 2/2 twills, in which use is made of the possibility of patterning the fabric by reversing the direction of the diagonals. Cat Nos 104/A9975 (Illus 10, 29) and 105/A10057 have a single reverse which, if repeated across the width or down the length of the web would have produced a chevron twill. Cat No 18/A12340a (Illus 11) has reverses with axes in the directions of both the warp and the weft, creating a diamond pattern.

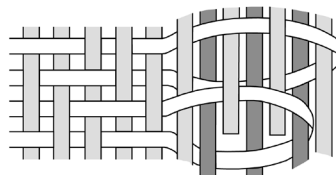
Selvages and evidence for loom types

There is a closed edge, which in most cases may be regarded as a side selvage, on 38 samples. Although there are examples of each of the basic weaves with a length of selvage intact, a disproportionate number of those surviving, 15 (39.47%), are on coarse tabby fabrics made from 2 ply yarns. The same feature has been noted on similar material from Dutch sites, leading Sandra Vons-Comis (1982a, 155) to suggest that either they were used for some purpose such as blankets which did not require much cutting and shaping of the web, or they were woven in narrow widths. As yet though, no complete loom-width has come to light. Twenty-eight of the selvages are simple constructions in which the weft turns directly back into the fabric at the end of its course, and there are no additional warp threads or other special arrangements (Illus 12). In other samples, measures have been taken to strengthen the edge of the web: in Cat No 92/A10193b, a 2/2 twill, the outermost three threads act as one. In Cat Nos 74/A11154 and 145/A10409b, both 2/1 twills with nap, the warp ends are paired for a width of 7mm and 10mm respectively. Another means for strengthening the selvage is found in Cat Nos 32/A11567c and 181/A8085, both twills woven from Z spun yarns, which have tubular selvages (Illus 13). Tubular selvages are present on a textile identified as a blanket from a chieftain's grave at Evebø/Eide in Norway, dating from the Migration Period (Raknes Pederson 1982, 75–6, Figs 1 and 2), indicating that this selvage arrangement was long lived. Hollow selvages date from the Bronze Age, at least; they were used preferentially in the Gallo-Roman period, as in the rest of Iron Age Europe (Wild and Bender Jørgensen 1988, 78). An unusual border treatment is represented by Cat No 157/A8366, where Z and S plied yarns form a heavily reinforced edge. This may have been designed to provide a robust selvage to enable the wet cloth to be stretched on a frame to dry after fulling, as part of the finishing process (see below), but it is a particularly early example of such a border (Walton 1981, 195–7). One further strengthened closed edge, that on Cat No 64/A9993b, a tabby made from 2 ply yarn of goat hair, requires comment. Whereas, as has been noted above, the closed edges on other fabrics of this type are simple, in this case the two outermost threads act as one, and the three in the next place act as one (Illus 14). It seems strange that such pains should have been taken with an otherwise exceptionally coarse and makeshift fabric – unless, perhaps, the brittle nature of the goat hair made it essential. It is just possible that this is a starting edge, examples of which have been found on coarse textiles of this kind elsewhere (Kjellberg 1982, 142; Pritchard pers comm).

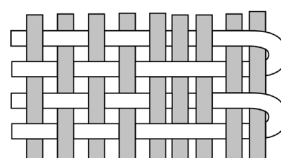
While the majority of the selvages undoubtedly come from the longitudinal edges of the cloth, there is at least one example of a transverse selvage, that is, the closed edge from the beginning (or sometimes the end) of the web found on fabrics made on vertical looms. The certain example is the looped and twisted edge on Cat No 84/A12553d, a 2/2 twill (Illus 15 and 32): no exact



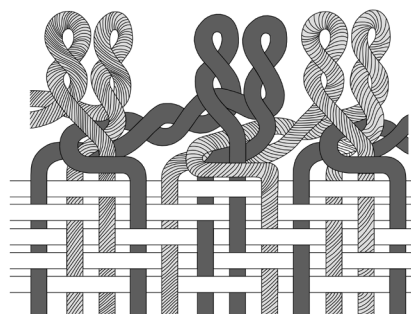
Illus 12 Simple selvage.



Illus 13 Tubular selvage. Cat No 181/A8085.



Illus 14 Strengthened selvage. Cat No 64/A9993b.



Illus 15 Looped and twisted starting edge. Cat No 84/A12553d.

parallel is known, but it is probably a variant of the corded starting edges found on some products of the warp-weighted loom (see 2/2 Twill with nap below). One other closed edge, that on Cat No 282/A09–0077a, a 2/1 twill (Illus 35), is a possible starting edge with heading cords. Since the appearance of Dr Hoffman's monumental study (1964) of the warp-weighted loom, it has generally been held that 2/1 twill was not a typical product of that loom type. The subsequent reporting of more examples of 2/1 twill with closed starting edges (eg Kjellberg 1979, 86–7; Lindström 1982, 182–3) reopened the question, suggesting the possibility that 2/1 twill was made on the warp-weighted loom more often than has been supposed. Not only have Batzer and Dokkedal (1992, 234) demonstrated that it is possible to weave 2/1 and other twills on the warp-weighted loom, it is also possible

that on occasions, the use of a starting edge might have been transferred to the newer horizontal loom. In view of this suggestion, it is particularly unfortunate that the Perth piece is poorly preserved, with the putative warp threads so deteriorated as to prevent proper analysis. It is difficult to arrive at any conclusions concerning the looms in use either in Perth or in medieval Scotland as a whole. It has been suggested that the change from domestic cloth production by women to professional manufacture by men, and with it the change from vertical to horizontal looms, began about AD 1000 in Western Europe (Hoffman 1964, 258–65). On this basis, since there is known to have been a craftsman-based cloth industry in Perth, as in other burghs, by the 13th century, the horizontal loom should have been present in Scotland during the period covered by the excavation. As yet, though, there is no evidence either to confirm or disprove this supposition. Nor are the cloths from the High Street helpful on this point; although 2/1 twills predominate among the finds, for the reasons noted above, their presence cannot be taken as indicative of the use of the horizontal rather than the vertical loom.

For the use of vertical looms in Scotland at this period, there is some positive evidence. As has been noted above, a few of the fabrics from the High Street, by reason of the presence of the starting edge, may be said to have been manufactured on a vertical, more particularly the warp-weighted, loom. The two twills should not, perhaps, be cited as evidence that the warp-weighted loom was in use in Scotland, since as they are not typical of the general run of twills from the site they are more likely to be imports; Cat No 84/A12553d is close to Scandinavian material. On the other hand, Cat No 64/A9993b, the tabby made from coarse 2 ply yarn, is of a type well-represented on the site and which seems likely to be a local product - if only because such low grade cloth could scarcely have borne the cost of transport. If the strengthened edge on this piece may be taken as a starting edge, then it is a useful indicator of the survival in the area of some kind of vertical loom. This would not be surprising for, as Dr Hoffman has shown (1964, 51–2), in some areas the horizontal loom took centuries to supplant the older type – until the 18th century in the case of Orkney and Shetland, for example. Perforated stones from most phases of the excavation at The Biggings, Papa Stour were identified as loom weights (Ballin Smith 1999, 175–7).

The possibility that the vertical loom should have continued in use in eastern Scotland during the Middle Ages, at least on a domestic basis, has been strengthened by the discovery of artifacts associated with the warp-weighted loom. In Perth Museum there is a sword beater (used for beating up the weft) found in Watergate, Perth, in 1898. As this was a chance find it was not stratified, but another recently excavated in Aberdeen came from an early 14th-century context; in addition, the same site in Aberdeen yielded a pin beater and a possible loom weight from later levels (Murray 1982, 180, 182, 184). Pin beaters were also excavated

from Perth High Street (see Textile tools below). So far these are isolated finds and if the warp-weighted loom was in widespread use it is curious that more loom weights have not been recovered; the possible weight from Aberdeen appears to be the only recorded example from a medieval site in mainland Scotland. Dr Grant (1961, 226–7) stated that ‘the weights for these upright looms, flat stones with holes through them, are found on old sites all over the Highlands . . .’ but did not go on to substantiate the point with specific instances. One further clue to the question of the continued use of the vertical loom might be the presence of gores in the excavated cloths (see Henshall 1952, 3–4). None has been noted among the Perth textiles, but as gores are difficult to identify in fragmentary material it is possible that some have been overlooked.

Dyes

A selection of the cloths woven from wool were subjected to dye analysis in 1979 by Professor Whiting and Dr J Harvey of Bristol University’s Department of Organic Chemistry. We are indebted to them for their comments, quoted below, and for the data set out in Table 1.

As is often the case with excavated textiles, the Perth fragments are almost all in shades of brown or black, with only occasional pieces showing obvious signs of having been dyed; among the latter it is generally a pink shade that is evident. Forty samples were selected at random, with a further one, Cat No 19/A12340b, selected by eye. In addition, a sample of pile from the fragment of carpet Cat No 403/A11083, was submitted: the discovery of a modern chemical dyestuff in the pile confirmed the opinion that this is of recent manufacture and not part of the medieval deposits.

The most striking aspect of the results is how few of the cloths examined can be said to have been dyed. Of the 41, only 14 gave positive indications, and even among these, the results for two, Cat Nos 119/A09–0136 and 204/A09–0133a, were extremely tentative. It may be added that Dr Ryder’s work gave a similar impression (see The wool and hair, below); whereas about two-thirds of the fabrics subjected to microscopic examination were found to have at least some degree of natural pigmentation, only six showed evidence of dyeing. The two sets of results taken together suggest that barely 30% of the cloths were dyed. In contrast, all twelve samples taken from textiles excavated from 80–86 High Street, Perth yielded evidence for dye residue (Harrison and Janaway 1997, 758). The finding of undyed fabrics at the High Street was not entirely unexpected. The burgh laws of the 12th and 13th centuries single out dyed, fulled and sheared cloth, the manufacture of which was the prerogative of craftsmen burgesses in the towns (*Ancient Burgh Laws*, 11, 97–8). This suggests, by implication, the existence of another class of fabrics, undyed and with little or no finishing, which were presumably those in general use

Table 1 Results of dye tests carried out on the wool cloths.

Cat/accession	phase	weave	no dye *	indigotin	madder	P/A ratio	kermes	others
South Sector								
19/A12340b	(Ia-)Id	2/1 twill	—	—	—	—	2,100	—
23/A11551a	(Ia-)Id	tabby	*	—	—	—	—	—
24/A11551b	(Ia-)Id	2/2 twill	*	—	—	—	—	—
31/A11567b	Ia-Ie	2/2 twill	*	—	—	—	—	—
35/A11567f	Ia-Ie	tabby	*	—	—	—	—	—
38/A11567i	Ia-Ie	2/1 twill	—	—	400	2/3	—	minute trace unknown blue dye (?)
69/A11510b	If,IIa	2/1 twill	—	—	—	—	—	Q, R, unknown (?)
95/A10624a	IId	2/2 twill	—	—	—	—	—	Q, K, R, unknown (?)
98/A10332	IId	2/1 twill	*	—	—	—	—	—
103/A12650	IId,Ile	tabby	*	—	—	—	—	—
105/A10057	IId,Ile	2/2 twill	*	—	—	—	—	—
109/A9907	IId-IIf	tabby	*	—	—	—	—	—
114/A8863b	IIa-IIff	2/1 twill?	*	—	—	—	—	—
119/A09-0136	<IIc-IIff	tabby	—	—	—	—	—	minute trace unknown blue dye (?)
127/A9478c	Ile-IIg	2/1 twill	*	—	—	—	—	—
134/A9271	<IIg(IIh)	2/1 twill	*	—	—	—	—	—
139/A9506	<IIg(IIh)	2/1 twill	*	—	—	—	—	—
167/A9056	Ili	2/2 twill	*	—	—	—	—	—
177/A09-0108	IIlb	2/1 twill	—	90	—	—	—	—
180/A09-0138	IIg-IIlb	tabby	*	—	—	—	—	—
187/A09-0091	IIlc	2/1 twill	*	—	—	—	—	—
196/A09-0123	IIId	2/1 twill	*	—	—	—	—	—
197/A8520	IIg-IIId	2/2 twill	*	—	—	—	—	—
204/A09-0133a	<IIlc-IVa	tabby	—	—	—	—	—	minute trace unknown blue dye (?)
213/A9905	IVa	2/1 twill	—	—	500	2/1	—	—
230/A6124c	IVb	2/1 twill	—	—	220	1/1	—	—
272/A09-0147	IVb	tabby	—	—	Trace	—	—	—
279/A09-0056a	IVb	2/1 twill	—	—	—	—	—	Q, unknown (?)
297/A8101	IVb,IVc	2/1 twill	—	—	600	1/1	—	—
301/A8097a	IVb,IVc	2/1 twill	—	9	2	high	—	—
309/A6653a	IIla-IVcc	2/1 twill	*	—	—	—	—	—
333/A6652a	Va	2/1 twill	*	—	—	—	—	—
334/A6652b	Va	2/1 twill	*	—	—	—	—	—
357/A6127d	Va,Vaa(VI)	2/1 twill	*	—	—	—	—	—
364/A6626	Va,Vaa(VI)	2/1 twill	*	—	—	—	—	—
365/A6627	Va,Vaa(VI)	2/1 twill?	*	—	—	—	—	—
372/A8880	Va,Vaa	2/1 twill	—	—	—	—	—	Q, K, R?
374/A09-0019	Vaa	2/1 twill	*	—	—	—	—	—
386/A09-0036	Va,Vaa	2/1 twill	*	—	—	—	—	—
North Sector								
410/A7336	(I)2	2/1 twill	*	—	—	—	—	—
411/A6147	G	tabby	*	—	—	—	—	—

All figures indicate parts per million

A = alizarin, K = kaempferol, P = purpurin + pseudopurpurin, Q = quercetin, R = rhamnetin

among poorer folk. Later, in the 15th century, there is surviving documentary evidence of attempts to restrict, through sumptuary legislation, the use of coloured cloths by the commons (Shaw 1979, 82–3). Further, finds in peat bogs of woollen clothing covering the period from about 1580 to 1715, little of which appears to have been made from artificially-coloured yarn (Henshall 1952; Henshall and Maxwell 1952; Bennett 1975), have suggested that even in more recent times many Scots must have been content with clothing in the natural whites, greys and browns of the native sheep. Even so, the high proportion of undyed cloths in the Perth samples is impressive.

The dye with the highest incidence in the Perth group is madder, which was identified in six samples. Professor Whiting notes for comparison that among the textiles excavated from Baynard's Castle, London – the site of docks filled in 1350 and 1499 with rubbish which

possibly included material derived from the adjacent Royal Wardrobe – madder was found in around 50% of all samples tested. The dye, which has a long history of use in Northern Europe (Brunello 1973, 14 *passim*), is derived from a plant which was widely cultivated in Europe during the Middle Ages but not, as far as is known, in Scotland. That it was available to Scottish dyers is clear from the Assize of Petty Customs which lists tolls for madder as well as for two other imported dyestuffs – woad and brazil – as well as the mordant 'alom' [alum] (*Ancient Burgh Laws*, 105); the list relates to the reign of Robert I (the Bruce) (1306–1329) and earlier. Depending on the mordant used, madder produces rose and various shades of red and brown. It is also known to have been used in combination with woad to produce black (Brunello 1973, 242). This may have been the intention in one cloth, Cat No 301/A8097a, in which madder and indigotin (derived from

woad or indigo) were found together, albeit in small quantities; alternatively, a shade of purple may have been aimed for. In another case, Cat No 38/A11567i, madder predominates, but is accompanied by a small amount of an unknown blue dye, not encountered in any other work, which could have been meant to give a wine-red shade similar to kermes.

Kermes, the other source of red met with in the group, is a greater rarity than madder in British medieval textiles. Like cochineal, its source is the dried bodies of insects, in this case the female of *Coccus ilicis* which is found in Southern Europe and North Africa. In the sample in which it was discovered, Cat No 19/A12340b (42), deposited during the first half of the 12th century, it is present in quantity; even after eight centuries and more in the ground it remains a strong bluish-red. Professor Whiting comments: 'I would imagine that if kermes were imported as a dyestuff and used locally, one would find it used sparingly and eked out with madder; in Baynard's Castle, as here, it is rare, but pure and abundant when found'. Kermes was expensive and, as might be expected, the fabric on which it has been used is of good (although not outstanding) quality – evenly spun and woven, with a fine, smooth finish: Professor Whiting suggests that it may have been a product of the highly skilled Venetian cloth industry. A similar fragment of kermes-dyed cloth, dating from the second quarter of the 14th century, was found at Baynard's Castle, London (Crowfoot et al 1992, Plate 2B and Figure 132, Cat No 50), although it is a tabby, rather than having the 2/1 twill binding of Cat No 19/A12340b. Walton Rogers (2001, 239) observed that two textiles recovered from a pit at 16–18 Netherkirkgate, Aberdeen, had a similar red appearance but analysis indicated that one was dyed with kermes and the other with madder.

Of the blue dyes present in the Perth samples, indigotin could have come, in theory, from either indigo or woad, the products of which are virtually indistinguishable. In practice, though, woad is the more likely candidate. It is thought that indigo was being imported to Europe by the 12th century, but references to its use in the West are not common until after the medieval period (Vetterli 1951, 3066–8). Likewise, indigo is difficult to trace in Scotland until the 17th century, when it appears on the import side of the 1612 customs list as 'Anneil of Barbarie for litsteris (dyers)' (*Halyburton's Ledger*, 288). Mentions of woad, by contrast, are moderately plentiful for the preceding three centuries. It appears that by the 14th century woad was sufficiently well known for the word to be used, on occasion, as a synonym for dyestuffs in general. As an illustration, the instructions issued to the Chamberlain as to the enquiries he was to make, when visiting the royal burghs on ayre, include an injunction to ask about 'litsters, burgesses, wha puttis their hands in the wadd' (*Ancient Burgh Laws*, 125); it should perhaps be explained that, at that time, the work of dyeing was considered to be incompatible with the dignity of burgh-ship, and a dyer who wished to

become or remain a burghess was required to delegate the practical aspects of his craft to servants. It is surprising that indigotin appears only twice in the dye samples (a minute quantity of blue dye, not indigotin, was present in three further samples). This relative absence may be due to chance, or possibly it indicates that the popularity of woad as a dyestuff in Scotland post-dates much of the Perth material. Alternatively it might be a reflection of the state of the cloth industry in Perth (see General discussion, below).

As for yellow dyes, Professor Whiting comments on the absence of luteolin, which was found in samples dating from the second quarter of the 14th century at Baynard's Castle, London (Walton 1992a, 201, BC72 Cat Nos 210 and 254). The usual source was weld, also known as Dyer's rocket (*Reseda luteola*), which was widely cultivated for this purpose. The plant also grows wild on waste ground, and it is interesting to note that seeds from the plant are present in soil samples from nine contexts at the High Street, if only in moderate quantities (see Fascicule 4, The botanical remains, 70). Remains of *R. luteola* were present in Phase 2a deposits (1250–1350) at 45–75 Gallowgate, Aberdeen (Kenward and Hall 2001, 286) and two *R. luteola* seeds were also identified by Fraser and Dickson (1982, 241) from Phase 1 pits (probably second half of the 13th century), at the Queen Street Midden Area in Aberdeen. While dyer's rocket is known to be a prolific seed producer (Kenward and Hall 2001, 286), Fraser and Dickson (1982, 242) cited Thurston's recommendation that *R. luteola* should be gathered before it seeds to obtain a strong colour. Such a practice might limit the occurrence of the seeds on archaeological sites.

In any case, yellow and brown dyes are not easily recognised in archaeological textiles (Walton 1992a, 201). The yellows that are present in the High Street textiles are kaempferol, quercetin and rhamnetin, which, as Professor Whiting explains, are regarded as inferior to luteolin: 'K, Q and R are the flavanols present in a huge number of plants, often residues from useful crops (pomegranate rind, onion skins, etc) and their use implies a less quality-conscious dyeing industry'. Other potential dye plants detected amongst the High Street botanical remains include bog myrtle (*Myrica gale*), which can be used to extract a yellow dye, gipsywort (*Lycopus europeus*), which produces a colour-fast black, bur-marigold (*Bidens tripartita*), used for producing a bright orange, and yellow flag (*Iris pseudacorus*), the roots of which have been used to produce grey-blue or black (see Fascicule 4, The botanical remains, 78–9). Traces of leaves and fruit from bog myrtle were also present on the 45–75 Gallowgate site in Aberdeen (Kenward and Hall 2001, 287).

Finishing

Rather less than one third of the wool cloths (98) appear to have been fulled, that is, pounded while

wet to shrink and hence to thicken and condense the fabric. Burial in damp conditions might have a similar effect, and it is possible that the felting together of the fibres visible on some of these pieces may have occurred in the ground rather than at the time of manufacture. However, if heat and friction were not involved in the process of deposition, it is unlikely that secondary felting would have occurred (Ryder and Gabra-Sanders 1992, 6; Gabra-Sanders and Ryder 2001, 126). All 98 cloths are 2/1 twills and all but six are woven from a combination of Z and S yarns. Seventy of these fabrics have a nap; after fulling, the surface fibres have been raised. In most cases the nap has then been sheared to level it. Taken to extremes, napping and shearing totally obscure the structure of the cloth, but only a few of the pieces have the smooth, felt-like surface which became a popular finish during the Middle Ages. A further three fabrics – Cat Nos 84/A12553d, a 2/2 twill, and 37/A11567h and 126/A9478b, 2/1 twills woven from Z spun yarns – have a nap but do not appear to have been fulled. How this effect was achieved is not clear, for raising the nap without fulling might be expected to damage the cloth.

How many of these finished cloths were locally made is debatable, but, as mentioned above (see Dyes, above), fulled and sheared fabrics were undoubtedly being produced in Scotland at the time and by craftsmen, rather than on a domestic basis. In Perth itself there were professional fullers by the 13th century (RRS, ii, no 467), although it is not clear whether they had access to a fulling mill or relied on hands and feet alone. Mechanised fulling is thought to have been introduced to England in the late 12th century (Carus-Wilson 1954, 188–90), but the earliest fulling mill on record in Scotland seems to be one belonging to Coupar Angus Abbey (Perthshire) in c1260 (*Coupar Angus Chrs*, 131).

Specialist shearers too made an early appearance (Craigie 1925, 66) and there are indications of the import of teasles (or teasels) referred to as *cardones* (*Ancient Burgh Laws*, 107), which were used to raise the nap before shearing.

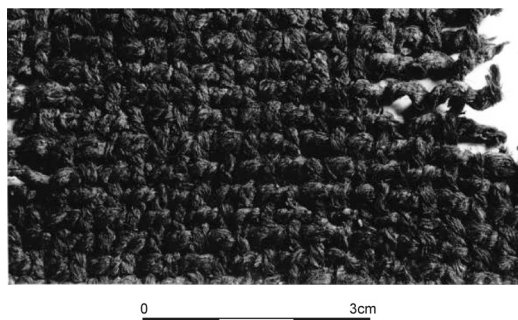
Sewing

The High Street site produced a number of needles – of bone, copper and iron and varying from fine to coarse – but there is a remarkable shortage of examples of needlework among the textiles. There are the obvious exceptions of the darned hair-coverings (see Net, below), and a few of the silks bear traces of stitching, but only 15 of the wool fabrics show signs of having been sewn. In twelve cases no thread remains, but lines of needle holes, marks in the cloth, or the felting together of two fragments serve to indicate the original presence of a seam; presumably the sewing was done with a vegetable fibre, such as linen, which has not survived prolonged burial. In the remaining three samples, wool yarn has been used. On Cat

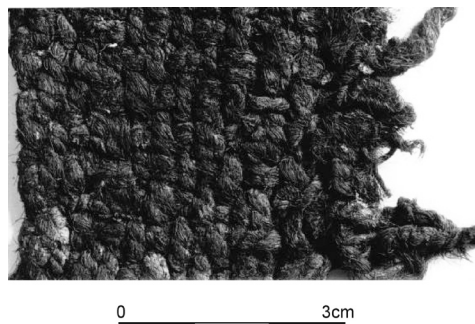
No 98/A10332, a twill, a tear has been mended by oversewing with firm Z spun yarn used double. Cat No 95/A10624a, a twill, has a margin turned under and slip-stitched with fine 2 ply yarn. Cat No 78/A10724, a heavy tabby fabric woven from 2 ply yarn, has a length of similar yarn run through it. Stitching is also to be found on some of the silk fabrics: Cat Nos 267/A09–0127 and 346/A09–0044 (both tabbies); Cat Nos 6/A9500 and 46/A7323 (both tubular bands of compound twill); and 271/A09–0097 (tablet weaving).

Tabby weaves from two ply yarns

The tabby textiles woven entirely from two ply yarns, of which there are 53 drawn from all phases, but with a concentration in the second half of the 12th century, form the most homogeneous group from the site. They are exceptionally heavy, mainly in the range 1–5 threads per 10mm, and are so coarse and harsh to the touch as scarcely to be classifiable as cloths (Illus 17). In Audrey Henshall's (1952, 17) account of early textiles found in Scotland, the one fragment of this type then known was said to have 'a heavy rough appearance quite unlike any other in the Museum'.



Illus 16 *Tabby woven from 2 ply wool yarn. Cat No 272/A09–0147.*



Illus 17 *Tabby woven from 2 ply wool yarn, with simple selvedge. Cat No 29/A7439.*

Tabby weaves from two ply yarns.

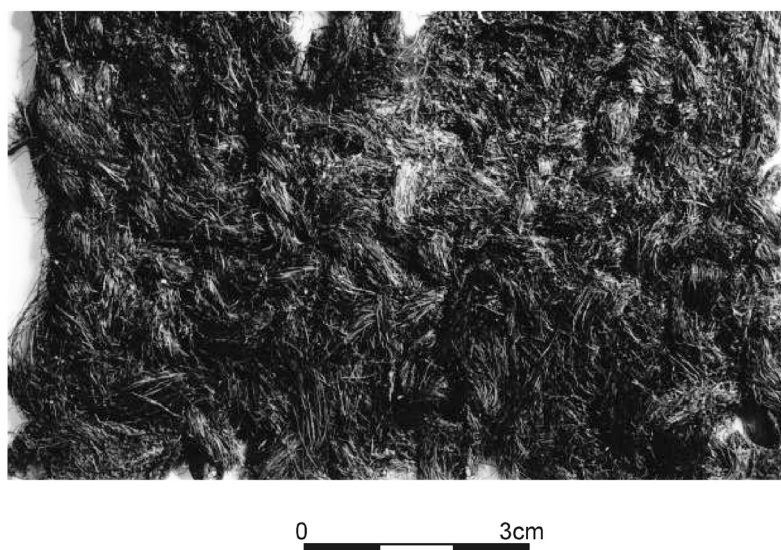
<i>Cat/Accession</i>	<i>Area</i>	<i>Rig</i>	<i>Feature</i>	<i>Phase</i>
South Sector				
5/A10072	1	VI	MC010a, SA3829	Ib
11/A11506*	4	V, VI	MC017	Ia-Icc>
12/A11155	3	V	MC031, Pit 5096	Ia-Id
21/A12340d	3	V	MC025, Pit 5337	(Ia-)Id
25/A09-0006	3	V	MC025, Pit 5337	(Ia-)Id
29/A7439	2	VI	MC030b	Id,Ie
36/A11567g	3	VI	MC037a, Pit 5157	Ia-Ie
42/A12614	4	VI	B16 (Phase 1), Pit 4742	(Id)Ie
47/A7339	2	VI	M14b(b)	Ie
48/A7568	2	VI	M14b(b)	Ie
55/A09-0035	3	VI	P5.3a	If
61/A12381	3	VI	MC053c	If
62/A2828	1/2	VI	MC044b	If
63/A9993a*	4	VI	B16 (Phase 2), Destruction	If,IIa
64/A9993b*	4	VI	B16 (Phase 2), Destruction	If,IIa
66/A12534	4	VI	B16 (Phase 2), Destruction	If,IIa
68/A11510a	3	VI	P5.3b	If,IIa
73/A6625	2	VI	MC061	IIb
75/A11673a	3	VI	MC056, Pit 5155	Ia-IIc
76/A11673b	3	VI	MC056, Pit 5155	Ia-IIc
78/A10724	3	VI	B4, 'Courtyard'-Occupation	IIc
87/A8857	2	VI	MC069, Pit 3584	(IIc)IId
101/A12343	3	VI	M1.1c, Pit 5005	IId
103/A12650	4	VI	MC084	IId,IIe
106/A10668	3	VI	M1.1a	IId,IIe
107/A10784	3	VI	M1.1a	IId,IIe
109/A9907	2	VI	M1.1d & M1.1e	IId-IIIf
118/A09-0007	3	V	B23, North Room-Occupation (1a)	IIb-IIIf
119/A09-0136	9	VII	B27, North Room & South Room-Occupation (1a)	<IIc-IIIf
120/A09-0137	9	VII	B27, North Room & South Room-Occupation (1a)	<IIc-IIIf
123/A9891	4	VI	B12, Occupation (1b)	IIf-IIIg
150/A10412	3	VI	M1.2, Pit 2648	<IIg(IIh)
151/A10427	3	VI	M1.2, Pit 2648	<IIg(IIh)
153/A11266	3	VI	M1.2, Pit 2648	<IIg(IIh)
156/A8497	4	V, VI	M11	IIh
159/A8505a	3	VI	M1.3	IIi
180/A09-0138	9	VII	M13	IIg-IIIb
221/A6126	3	VI	B2, WW2498	IVa,IVaa
246/A09-0101	7	VI	M1.4f	IVc
270/A09-0099b	7	VII	B18 (Phase 2b), North Room, Hall & Hall South-Occupation (10)	IVb
272/A09-0147	7	VII	B18 (Phase 2b), North Room, Hall & Hall South-Occupation (10)	IVb
274/A09-0032a	9	VII	B18 (Phase 2b), North Room, Hall & Hall South-Occupation (10)	IVb
292/A09-0029	9	VII	B18 (Phase 2b), Hall South-Occupation (13b)	IVb
299/A9904	3	VI	M1.4d	IVb,IVc
306/A6144	3	V, VI	M1.4c	IIIa-IVcc
313/A6701	3	V, VI	M1.4c	IIIa-IVcc
358/A6127e	3	V, VI	M1.5a	Va,Vaa (VI)
384/A09-0043	7	VII	M8a	Va,Vaa
393/A09-0008	7	VII	P8.5	Vb,Vbb
398/A8869	4	V, VI	M3a	Vb-Vc
400/A8858	4	V	M3c	Vd
407/A09-0005	7-10	VI-VIII	Unstratified	U/S
North sector				
410/A7336	5	-	Ditch	(1)2

* Goat hair

The description is equally applicable to the Perth group and these fabrics have a primitive appearance. The threads are often unevenly packed and of irregular tension; there is no finishing, and in 13 surviving selvages the weft simply passes round the outermost warp and no measures have been taken to strengthen the edge (Illus 12, 18). In a mid-12th-century example, Cat No 64/A9993b, the closed edge is slightly more complex (Illus 14), but there is no means of determining whether this is a side selvage or, as has been found on fabrics of this type elsewhere (see Selvages, above), a starting edge. As regards colour, most of the fragments have an irregular mottled tone from the yarn having been spun from unsorted, naturally-pigmented fibres of varying shades. It is unlikely that the colour in these fabrics was ever reinforced by dyeing; of 12 samples from six fabrics examined by Dr Ryder, eight were found to be heavily pigmented, but none revealed any trace of dye. Further, the six samples analysed by Professor Whiting gave four negative results, and the remaining two contained traces so minute that the possibility of the complete web having been dyed is considered fairly remote. Perhaps these few dyed fibres are an indication that waste wool from other purposes was sometimes incorporated.

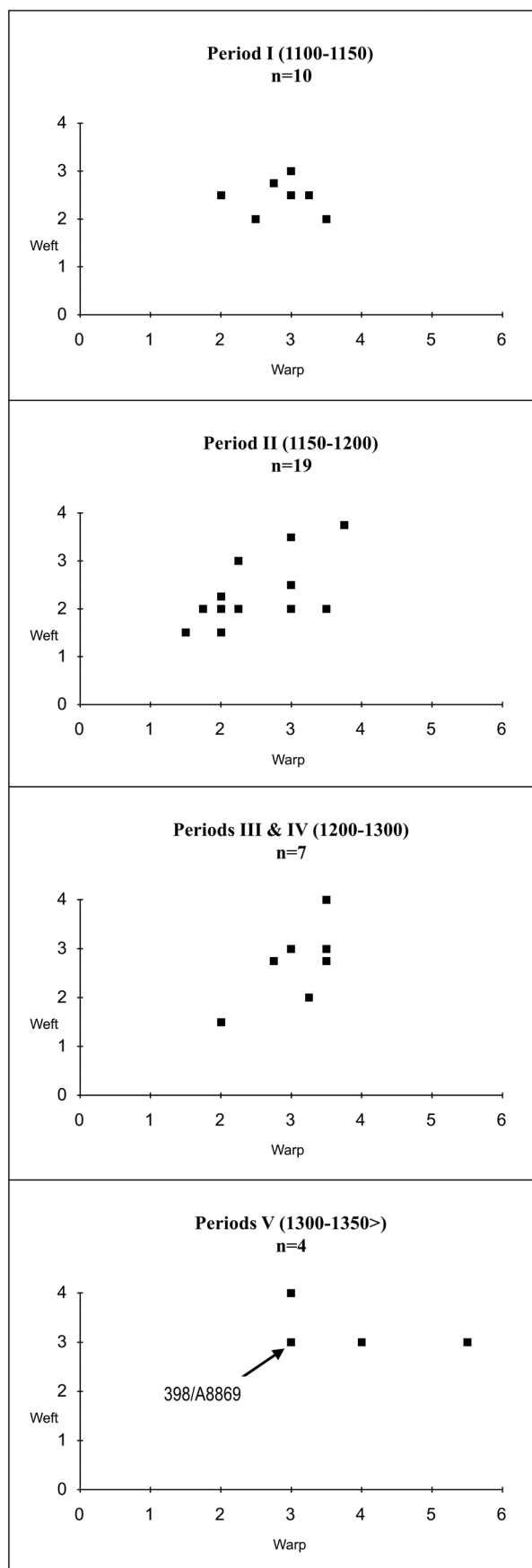
The harshness of these fabrics results in part from the use of yarn spun from coarse, hairy fibres. Generally these are from sheep, but on examination by Dr Ryder, two exceptionally coarse pieces, Cat Nos 63/A9993a (Illus 18) and 64/A9993b, proved to have been made from goat hair. With the exception of Cat No 398/A8869, which is made from both Z and S twisted yarn, the same yarn appears to have been used in both systems; 41 pieces are constructed from 2 ply yarn twisted in S direction (from Z spun components), and 10 from yarn twisted in Z direction (from S spun

components). (In Cat No 156/A8497, an unconserved piece, the identification of the spin and ply directions is not clear.) There is no obvious structural reason for the use of a yarn with a different twist in these latter fabrics, and in all other respects they are similar to those in the former group. Moreover, there is some variation in the looseness or firmness of the ply angle in both types of yarn. Nor has any chronological trend been detected; both are present in all five periods of the site, the Z plied yarn in consistently fewer numbers (Illus 38). This type of heavy tabby fabric is by no means unique to the High Street excavation, but has been found in medieval layers on other sites, both in Scotland and elsewhere. There are four pieces (all with S plied yarns) from an excavation in Kirk Close, Perth, on the opposite side of the High Street (Bennett 1987, 159), and one with Z plied warp and weft of 13th- or 14th-century date from Aberdeen (Bennett 1982, 199). As mentioned above, Audrey Henshall (1952, 17) described a similar textile with S plied yarns, which came from a long cist of probable medieval date found near Kelso Abbey, Roxburghshire. At the time of publication the yarn was thought to be of vegetable fibre, but it is now recognised as wool. Four 14th-century examples are known from the Quayside, Newcastle upon Tyne (Walton 1988, 52), two of which have S ply yarn (of cattle hair and goat hair, respectively), and two Z ply yarn (of goat hair and ?wool). There are parallels from London, including an 11th-century goat hair tabby from Milk Street (Pritchard 1984, 59), and 13 further samples, also apparently of goat hair, mainly from waterfront revetment dumps on the Thames, dating from the early 13th to late 14th centuries (Crowfoot et al 1992, Table 8). In contrast with the Perth two ply tabbies, only one of the London pieces has S ply warp and weft; all the others are of Z ply yarn.

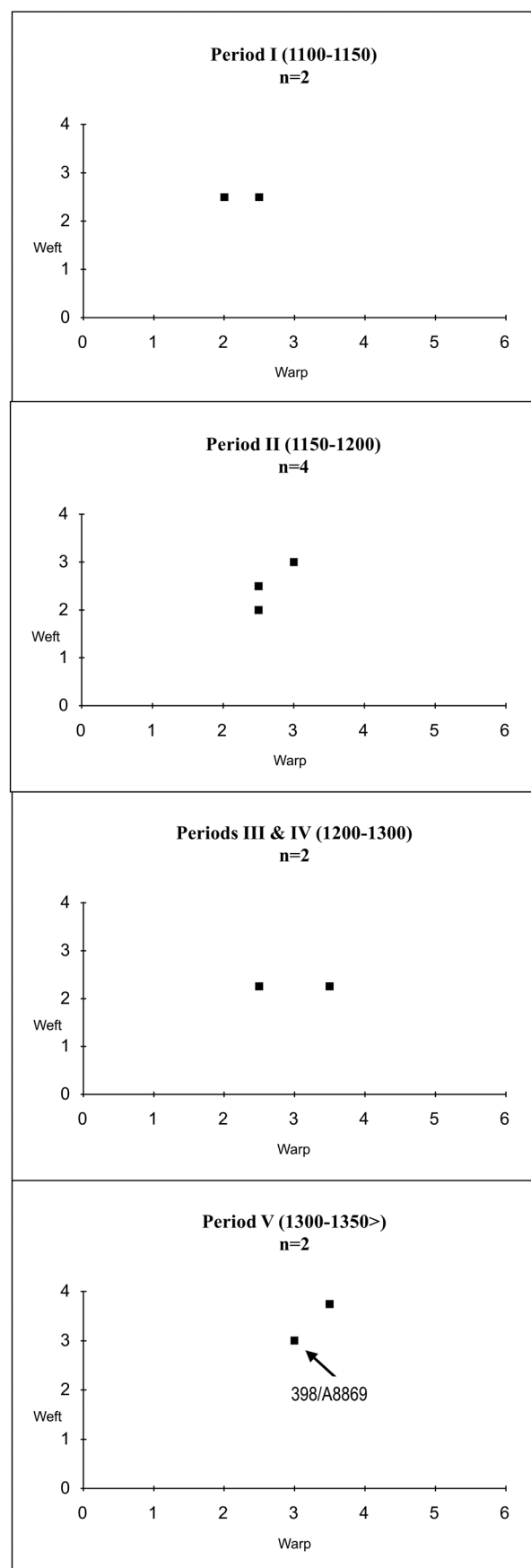


Illus 18 Tabby woven from 2 ply yarn of goat hair. Cat No 63/A9993a.

Thread Densities of Tabby Weaves (2S Ply Yarn)



Thread Densities of Tabby Weaves (2Z Ply Yarn)



Illus 19 Scatter diagrams of the South Sector stratified tabby weaves from 2 ply yarns, showing average thread counts per 10mm.

Numerous examples of two ply tabbies are known from Scandinavia and elsewhere in northern Europe (eg Bender Jørgensen 1979, 3; Kjellberg 1982, 138; Vons-Comis 1982a, 155; Schjølberg 1984). Goat hair was encountered in comparable tabbies excavated from the site known as 'The Farm beneath the Sand' in Greenland (Østergård 2009, 75).

It has been suggested that the S plied tabbies represent a north German/Scandinavian type, and it has been further observed that they have a slightly denser thread count than tabbies of Z plied yarns (Schjølberg 1984, 88; Walton 1988, 82). Although it might be argued that some of the Perth tabbies represent packaging which protected imports from the Baltic and north Germany (given the presence of imported wooden items and pottery from those areas in the High Street assemblage), the thread densities of the Perth pieces do not lend support to the observations. The Perth Z plied tabbies seem to have a fairly constant thread count through time, while more variety may be observed in the S plied tabbies, which occur in far larger numbers, especially in Period II. There is a tendency towards slightly higher thread counts in S plied tabbies in Periods III to V, but the numbers are rather low for any degree of confidence. In any case, Cat No 398/A8869 confounds proposed distinctions based on ply direction, since it has Z plied yarn in system 1 and S plied yarn in system 2.

Despite the considerable quantities in which this fabric has been recovered from the High Street site its purpose can only be conjectured. In addition to the piece from near Kelso Abbey, Roxburghshire, at Lund, Sweden and in late 14th-century Winchester it was used for shrouds (Lindström 1982, 181; Crowfoot 1990, 485), but the frequency with which it is found on habitation sites indicates that it was not confined to this purpose. Apart from the haircloth associated with ascetics (Østergård 2009, 75), such a coarse, harsh textile is unsuitable for clothing or bedding. In some cases the fragments are so inelastic, open-textured and generally ill-made, that it is difficult to imagine any use for them except perhaps as inferior horse-blankets, matting, or the like. One of the pieces from Newcastle Quayside was heavily tarred and another was associated with caulking material, leading to the suggestion that they might have played a role in the caulking of ships timbers (Walton 1988, 82, 91). The majority at Perth, however, might well have served as sacking and packaging. The rectangular pad into which Cat No 11/A11506 was folded suggests such a use. It is usual for vegetable fibres to be used for this purpose, as being generally cheaper (and more robust) than wool. Yet this might not have been the case in medieval Perth. Little is known of the cultivation or availability of flax and hemp in Scotland before the 16th century, and the fact that a number of shoes from the excavation proved to have been sewn with sheep's wool or even cow hair (see The leather, this fascicule, for further details), both of which are ill-suited to the job, suggests that on occasions vegetable yarn may have been in short

supply. If, at the same time, goat hair and coarse wool from native sheep, which was not ideal for clothing or furnishing purposes, was readily available, then to manufacture it into packaging may have been the more economical course.

Tabby weaves from single yarns

Unlike the examples of tabby woven from 2 ply yarn, those manufactured from the more usual single ply yarns are few and heterogeneous and do not form a coherent group. The only additional common factor is that all are without nap. This absence of napped tabby cloths is unexpected in view of Elisabeth Crowfoot's (1977, 374) comment that they are one of the commoner types of fabric found on English medieval sites. In the Perth group there is a wide variation in both weight and quality. Lightest, and best made, is a fine open-weave undyed fabric, Cat No 35/A11567f, from before 1150 (Illus 20). Now reduced to fragments, it is constructed from combed, firmly-spun yarn with Z spinning in both systems and, considering its open texture, is remarkably stiff; it might have served as a backing or interlining in a garment or other textile item. Similar, but even finer, cloths are known from late 12th-century Oslo (Kjellberg 1982, 138) and from a late 13th-century context in Trig Lane, London, (the latter is actually a fine worsted tabby; it is one of the few tabbies from London with a slightly open-textured balanced weave said to characterise many earlier textiles (Crowfoot et al 1992, 43 Cat No 397). Tiny fragments of another fine textile with Z spun warp and weft have been detected in the fill of a gully dated to the late 12th or 13th century beneath the medieval hall house at Tŷ Mawr, Castell Caereinion, Montgomeryshire (Dransart 2001, 110). However the yarn here may have been spun from bast fibres and it



Illus 20 *Tabby woven from firm worsted yarn. Cat No 35/A11567f.*

Tabby weaves from single yarns.

<i>Cat/Accession</i>	<i>Area</i>	<i>Rig</i>	<i>Feature</i>	<i>Phase</i>
South Sector				
20/A12340c	3	V	MC025, Pit 5337	(Ia–)Id
23/A11551a	3	V	MC025, Pit 5337	(Ia–)Id
34/A11567e	3	VI	MC037a, Pit 5157	Ia–Ie
35/A11567f	3	VI	MC037a, Pit 5157	Ia–Ie
133/A9130	3	VI	M1.2, Pit 2648	<IIg(IIh)
204/A09–0133a	7	VI	MC119, Pit 7390	<IIIc–IVa

is possible that the fine, open-weave textiles of wool imitated similar products of linen or other plant material.

Three of the other Perth pieces have a corded appearance resulting from the threads in one system being sufficiently closely packed to obscure those in the second. Cat No 204/A09–0133a (Illus 21) is heavy weight and consists of two pieces, both with a closed edge on one long margin. In the obscured system, which runs perpendicular to the closed edge, the threads run in pairs and the strips may be the remains of a starting edge. However, as the pairs of threads continue to run as one on reaching the edge, rather than separating into adjacent sheds (cf Hoffman 1964, Figure 75), it is more likely that they represent the weft, and the closed edge a side selvedge. Cat No 34/A11567e, which is lighter weight and has single threads in both systems, is fragmentary and in poor condition. Cat No 20/A12340c (Illus 22), which is lighter still, is one of the few patterned fabrics from the site; the predominant system is striped (?) yellow and brown. The fragment has no closed edge, but the obscured system, the threads of which are widely spaced and insubstantial, is more likely to have been the weft. If this is the case, the fragment may be the remains of a narrow textile, comparable with later examples which served as garters, straps or belts (Henshall 1952, 26; Henshall and Maxwell 1952, 35). In Scotland in more recent times such textiles were made on a variety of simple looms (Mitchell 1880, 11; Grant 1961, 237). Of the remaining tabby fabrics, Cat No 133/A9130 is coarse and too small for the identification of the weave to be certain, while Cat No 23/A11551a is medium weight, irregular and ill-made.

Tabby weaves of silk

P Z Dransart

Eight tabby woven silks were excavated from different areas of the site. One of these samples consists of two narrow ribbons stitched to sections of tablet-woven band (Cat No 271/A09–0097). This fabric is discussed more fully under the category of Tablet-woven textiles; only the tabby ribbons are considered in this section. Four further compound weave textiles are considered below (see Twill weaves of silk, below).



Illus 21 *Extended tabby with simple selvage. Cat No 204/A09–0133a.*



Illus 22 *Tabby with striped ?warp. Cat No 20/A12340c.*

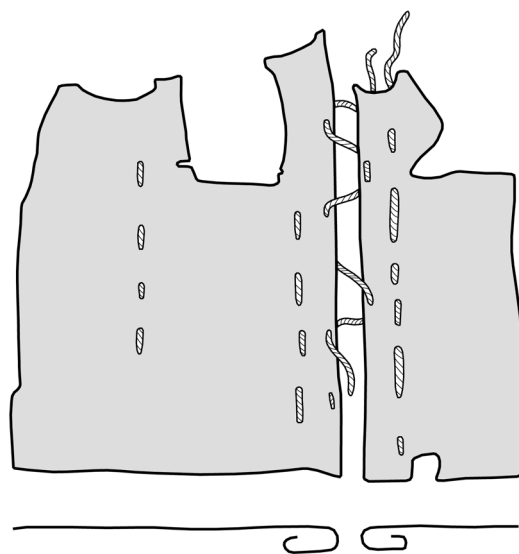
Tabby weaves of silk.

<i>Cat/Accession</i>	<i>Area</i>	<i>Rig</i>	<i>Feature</i>	<i>Phase</i>
South Sector				
4/A9976	1	VI	MC006, T3852	Ib
267/A09-0127	7	VII	B18 (Phase 2a), External 1, Pit 7314	IVb
271/A09-0097	7	VII	B18 (Phase 2b), North Room, Hall & Hall South-Occupation (10))	IVb
323/A09-0059	7	VII	M9a	IVc, IVcc
343/A09-0046	7	VII	P8.4	Va
344/A09-0047a	7	VII	P8.4	Va
346/A09-0044	7	VII	P8.4	Va
362/A6149	3	V, VI	M1.5a	Va, Vaa(VI)

In the descriptions of the spin and ply directions in the sections of this fascicule relating to silk, the letters Z, S and I are used. The first two letters correspond to the spin directions of Illus 2, while the third denotes a thread with no appreciable spin direction. The technical term for twisting reeled silk is 'throwing' (that is, 'turning'), a term which can be traced from at least the 14th century. A silkwoman might be known as a 'silk throwster' and the yarn she produced 'thrown silk' (Lacey 1987, 196 n12).

Four of the silks, from deposits dating from the second half of the 13th or from the early 14th century, have similar characteristics (Cat Nos 267/A09-0127, 343/A09-0046, 344/A09-0047a, and 346/A09-0044). They are woven in a tabby weave which is close to balance; in other words they have a similar thread count in both systems. The threads in one system are Z thrown and the threads of the second system are untwisted (I). Since two of the pieces have a selvedge along one edge (Cat Nos 343/A09-0046 and 344/A09-0047a), it would seem that the warp consists of Z thrown silk yarn, and the weft of untwisted yarn. The warp tends to be of a finer, more consistent diameter than the weft, which is often slightly irregular. Three of these silk tabbies have a warp count which falls in the range of 33–38 threads per 10mm, and a weft count of 32–35 threads per 10mm. The fourth, Cat No 267/A09-0127, has a count of 42 warp threads and 38 weft threads per 10mm. It is further distinguished by its colour, which is now a dull crimson red. All four have been carefully cut into rectangular or trapezoidal shapes.

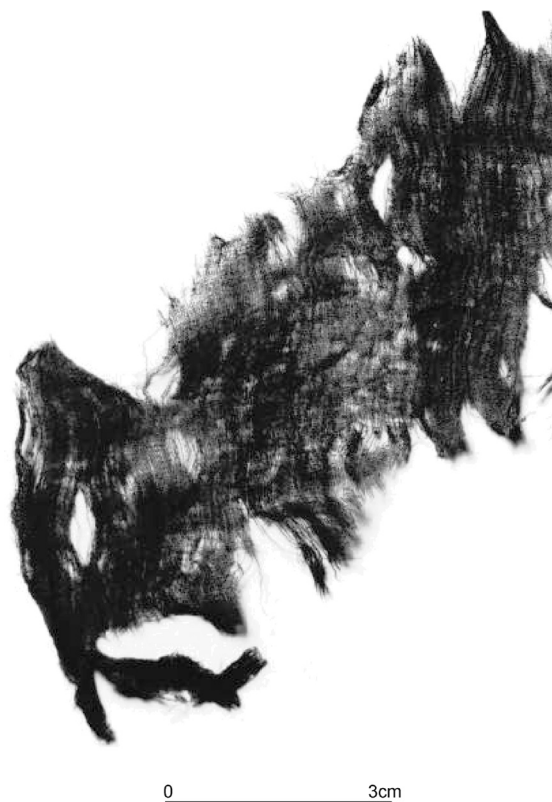
Traces of stitching remain on two of these ZI tabbies. Cat No 267/A09-0127 retains a few stitches of light brown, loosely S plied silk thread. More detail has been preserved in Cat No 346/A09-0044, since the piece was cut across a seam uniting two sections of fabric. The edges of the two pieces were turned under twice to form a hem, and a widely spaced, loose overcast stitch was executed through the folds, joining the two together. A straight running stitch holds down the hems, and a further section of running stitch survives, parallel to the hem on one side (Illus 23). A dark brown 2 ply yarn (Z thrown and S plied) was used for all the stitching.



Illus 23 *Stitching on silk tabby. Cat No 346/A09-0044.*

While Cat No 323/A09-0059, recovered from deposits of the late 13th century, is an offcut, it is unlike the four ZI tabbies because it is cut on the bias. It is a tabby of full-bodied appearance with a similar thread count in both systems. There are 41–45 threads per 10mm in system 1; the yarn of this system is Z twisted. It is regular in diameter, save for an occasional thread which is more coarse. Two threads seem to have been used in broadly alternating blocks in system 2; an untwisted yarn with a count of 48–50 threads per 10mm, and a coarser yarn with a count of 19 per 5mm. This coarser yarn has a slight Z twist and it is visible at an upper and a lower angle of the offcut, which has the shape of an attenuated triangle.

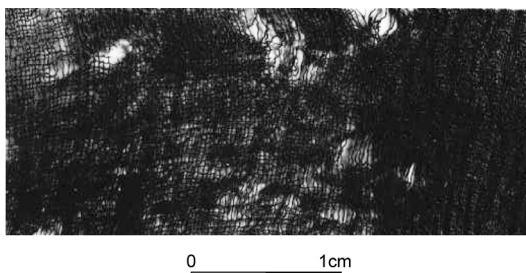
The remaining three silk tabbies from the High Street display a greater variety of characteristics. Cat No 362/A6149, from a level dated to the early 14th century, has Z twisted yarn in both warp and weft. Although it has a high thread count (51–54 threads per 10mm in system 1 and 33 threads per 10mm in system 2), both warp and weft are widely spaced. Hence the



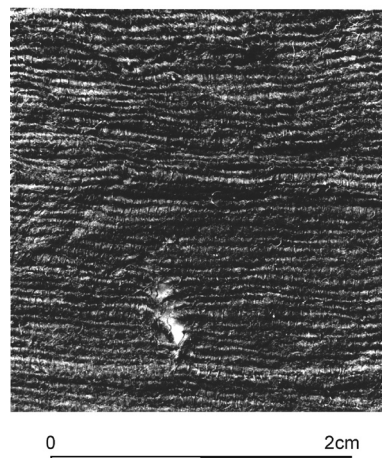
Illus 24 Silk tabby. Cat No 362/A6149.



Illus 26 Silk tabby, with grège weft. Cat No 4/A9976.



Illus 25 Detail of silk tabby. Cat No 362/A6149.



Illus 27 Detail of silk tabby, with grège weft. Cat No 4/A9976.

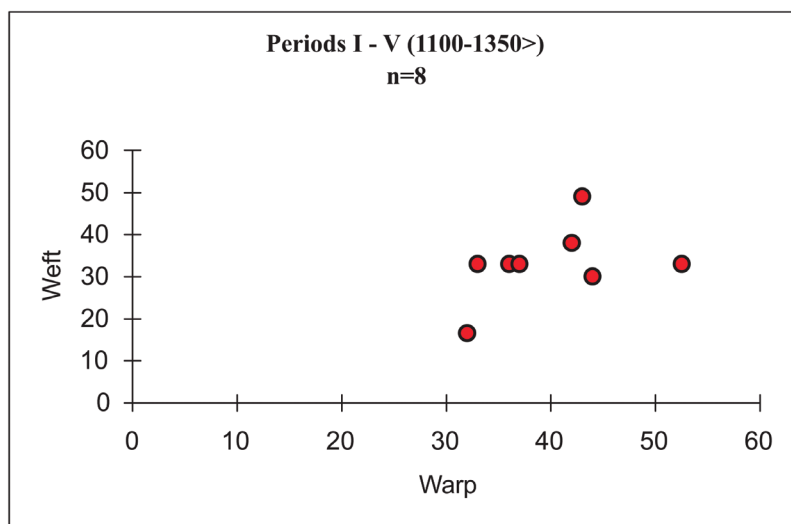
web has an open, delicate character (Illus 24, 25). It is of a donkey brown colour; the fragment has the shape of an irregular parallelogram with worn edges which were, perhaps, once cut. The overall regularity of the shape suggests that this textile was part of a length of bias binding which was reused, perhaps several times.

Another textile of irregular outline is Cat No 4/A9976 (Illus 26, 27), of which three fragments have survived. The thread in both systems is yellow-brown in colour, but there is a striking difference between

warp and weft. In system 1 the yarn is extremely fine and Z twisted; there are 32 threads per 10mm. In contrast the yarn in system 2 is much coarser and it has a matte appearance. This yarn has a very slight Z twist, and there are only 16–17 threads per 10mm. A preliminary inspection of the textile indicated the presence of traces of a metallic substance. However, further investigation by X-ray fluorescence gave negative results for silver in the Research Laboratory of the National Museum of Antiquities of Scotland

	Warp	Weft
4/A9976	32	16.5
267/A09-0127	42	38
271/A09-0097	44	30
323/A09-0059	43	49
343/A09-0046	36	33
344/A09-0047a	33	33
346/A09-0044	37	33
362/A6149	52.5	33

Illus 28 Scatter diagram of the tabby weaves of silk showing average thread counts per 10mm.



(now National Museums Scotland). Examination of one of the particles in polarised light at a magnification of x400 showed it to be both transparent and crystalline. The likelihood, therefore, is that the particles are not metallic, as originally thought, but some substance such as quartz or mica, presumably derived from the burial deposit. This textile was recovered from a deposit belonging to the early 12th century. Hence it belongs to a significantly earlier context than the other silk tabbies from the High Street site.

The final fabric considered in this section is actually a ribbon, of which two sections remain, interspersed between pieces of tablet-woven band (Cat No 271/A09-0097; Illus 53). In this tabby the warp is predominant, since the warp is more tightly spaced than the weft. Both warp and weft are light brown in colour. However, the warp is S thrown and the finer weft is Z thrown. The ribbon measures 4–5mm wide, and there are 22 warp ends in the complete width. This would be equivalent to at least 44 warp threads per 10mm. The picks of the weft are unevenly packed, and there are 26–31 threads per 10mm.

Silk textiles have been produced over an extremely long period of time – at least four thousand years in China (Geijer 1979, 75). Some general, broad scale chronological and geographical trends have been detected among surviving silk tabbies (ibid, 75–6; Muthesius 1982a, 133; Walton 1989, 374). In general, tabby weaves have received little attention from art historians (Geijer 1979, 63), hence they are often only given a broad chronological grouping. Most extant silks in Europe have been preserved in treasuries and tombs, where they lack the chronological contexts that archaeological excavations may provide. For instance, some silk tabbies in the treasury of St Servatius, Maastricht, in the Netherlands, have been attributed to a timespan which predates the eighth century continuing up to the 12th century (Muthesius 1974, 326–7). A rare example of a tabby bearing a Kufic inscription reveals that the textile (housed in the Bamberg Diocesan Museum) may be dated before 1047,

and that it was woven in an Islamic centre (Müller-Christensen 1960, 54). It has Z thrown elements, with a count of 26–29 warp threads and 31 weft threads per 10mm.

Most of the discussions concerning chronological and geographical trends in silk tabbies focus on two main characteristics: thread densities and the direction of twist in the constituent yarns. As far as the former is concerned, it has been demonstrated that thread counts made on silk tabbies from 9th- to 11th-century contexts at 16–22 Coppergate, York, fall within the middle to lower end of the range of the densities recorded for such textiles in European treasuries (Walton 1989, Figure 157). In other words, there is a tendency for greater numbers of finer fabrics to be represented in the treasuries. Although the Perth silk tabbies are considerably later than their York counterparts, they too belong to a somewhat similar range towards the middle and coarser end of the range (Illus 28). Nevertheless, comparisons between the High Street silk tabbies and material in treasuries may be made. A ZI tabby of dark violet colour found in a sarcophagus at Chur, Switzerland, has a warp count of 33–35 threads and a weft count of 35 threads per 10mm (Schmedding 1978, 79–80, Cat No 81). (For further examples, see Schmedding 1978, Cat Nos 35a, 35d, 35e and 37 from Beromünster, Nos 82a, 82b, 82d and 82i from Chur and No 228 from Sion.)

Differences in the combinations of yarns, whether Z, S or I, have been attributed to various geographical regions in which silks were produced. However, with the exception of silk tabbies in which both warp and weft are of untwisted yarn, often assigned to China or Central Asia (Schmedding 1978, no 8; Walton 1989, 374), the provenance of fabrics cannot be reliably identified on this basis alone. In any case, this combination is not present in the High Street silks. An early 13th-century silk tabby with warp and weft lacking 'any appreciable twist' is known from the Seal House site in London (Crowfoot et al 1992, 90). The ZI combination, with a Z thrown warp and untwisted

weft, tends to be more commonly represented at sites and in western treasuries (Walton 1989, Figure 157c). This situation is reflected in the High Street sample, with four of the silk tabbies displaying the ZI combination.

The selvages, where preserved, have greater potential for revealing differences in the tabbies. Silk tabbies dating from pre 11th-century levels at 5 Coppergate and 16–22 Coppergate, York, have paired warp ends for strengthening the selvages (Muthesius 1982a, 133; Walton 1989, 363). In contrast, the High Street silk tabbies discussed above (Cat Nos 343/A09–0046 and 344/A09–0047a) have a selvedge which consists of an outermost bundle of threads and more tightly packed warp ends immediately adjacent to the bundle. This is a type which has also been reported among 13th- and 14th-century silk tabbies from London (Crowfoot et al 1992, Table 10). However, also present in the London silk tabbies of the second quarter of the 14th century, as well as of the last quarter of the 14th century, are tabbies in which the selvedge consists of several paired or grouped warp threads (Crowfoot et al 1992, Table 10).

Most of the silk tabbies from the High Street were cut down or represent worn fragments of larger pieces of cloth. Cat No 271/A09–0097 is an exception since it is a narrow ribbon. It has a warp with a slight S twist and a weft with a slight Z twist. This is an unusual combination. It has been suggested that S thrown silk yarn in both warp and weft, or S thrown warp and untwisted weft, are combinations often associated with narrow ribbons, on the basis of finds from Viking age and medieval sites in Dublin and York (Pritchard 1988, 157; Walton 1989, 374). However ribbons and tape from Saxon London have Z thrown or untwisted warp elements (Pritchard 1984, 60). Some variety has been reported in the literature, since 10th- and 11th-century silk ribbons from Winchester have an untwisted warp and S twisted weft (Crowfoot 1990, 481–2, Cat Nos 1017 and 1018). The nearest examples to the SZ combination in the Perth ribbon would seem to be a textile from Winchester, with a possible warp which is mostly untwisted (it displays an occasional S twist) and a Z twisted yarn in the second system (ibid, 482, Cat No 1019), and a narrow fragment from late 13th-century Southampton, with the thread of one system untwisted and that of the other system Z twisted (Crowfoot 1975, Cat No T2).

The silk tabbies found in treasuries were used for wrapping relics and as burial wrappings. They were also used in garments; on Viking sites (5 and 16–22 Coppergate, York, Saltergate, Lincoln, and Dublin), rectangular lengths of silk tabby have been found made into simple caps (Muthesius 1982a, 136; Walton 1990, 68–9; Heckett 1990). These caps predate the 11th century. However, silk tabby cloth continued to be associated with headgear. In 12th-century England, girls and women of high rank wore

their hair in plaits encased in silk sheaths known as *fouriaux*, or more generally from the 12th to 14th centuries, women wore a wimple or gorget which was sometimes of silk (Cunnington and Cunnington 1952, 40). It is possible that some of the Perth silks may have originally formed neck coverings or headgear.

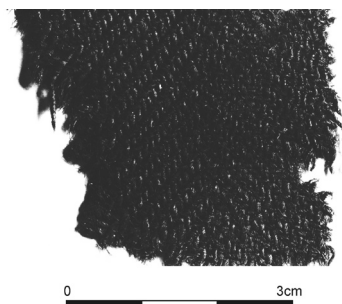
However the silks were employed, it is certain that silk cloth represents an import in Scotland. In addition to China, Persia, Byzantium and various Islamic countries all had flourishing silk weaving centres. The term tabby is derived from *attābī*, after a type of silk textile woven in the quarter of the same name in Baghdad (May 1957, 67); Dr Johnson (1785) regarded tabby as a 'kind of waved silk'. As the influence of the Byzantine empire waned in the 11th and 12th centuries, Islamic countries were increasingly in a position to export textiles to the west. Prior to this, Syria had been one of the first countries to establish its independence from the empire, and it was already one of the most highly esteemed producers of silks. With the expansion of Islam, the weaving of silk soon spread to other areas. Sericulture and silk weaving probably date from the eighth century in Spain, reaching a peak of production during the 13th century (May 1957, 3–10). Since the 'Miracle of the Silkworms', recorded as one of the *Cántigas de Santa María*, edited by Alfonso X, King of Castile and León, concerned a Christian woman of Segovia who was a weaver of silk headdresses, it can be seen that the craft was not only practised by Muslims.

Silk weaving was also established in Italy and France. In Paris, silkworkers might belong to one of several craft guilds whose statutes were compiled c1270 by Estienne Boileau (*Règlements sur les arts et métiers de Paris*; Depping 1837). Typically these guild regulations forbade craftworkers from weaving at night when the light was poor. Members of the guild of workers in silk textiles were able to become 'a mistress' (*mestresse*) of the craft after fulfilling an apprenticeship of at least six years and after practising it for 'a year and a day' (ibid, 88). Another guild, that of the weavers of silk kerchiefs (cloths for covering the head) stipulated that people wishing to become members had to demonstrate that they knew well and truly (*bien et loialement*) its uses and customs; they had to accomplish an apprenticeship of at least seven years (ibid, 99–100). Another statute was inserted in Manuscript B of the *Règlements*: 'No one may sell warped cards, if they are not worked in the craft' (ibid, 100 n1).

It is likely that the reputation deriving from the control over weaving such a prized material travelled with the silks that reached Perth. The condition of these remnants indicates that they were probably used in garments. Some had perhaps been recycled several times before being discarded and others seem to have been cut from larger, perhaps worn, textiles. The recycling of cloth is considered below, in the section on Dress in medieval Perth.

2/2 Twill without nap, ZZ

There are 20 samples in this group, all but a few of which have shared characteristics and are of roughly similar type. The majority are light or medium weight fabrics, moderately close-woven, with similar yarn used for warp and weft and the two systems close to balance; the counts range from 16 by 15–17 threads per 10mm in Cat No 239/A09–0069 to 8 by 8 threads in Cat No 31/A11567b. The constituent yarns may be classed as worsteds (see Spinning, above) and the texture of the weave is clearly visible. Even so, not all are firm to the touch, and Cat No 409/A09–0009 in particular is quite soft. The colour of the cloth is generally even, suggestive of careful sorting of the wool before spinning. Four samples (Cat Nos 31/A11567b, 105/A10057, 167/A9056 and 197/A8520) gave negative results when tested for dyes, while Cat Nos 167/A9056 and 181/A8085, examined by Dr Ryder, showed a substantial degree of natural pigmentation. With the exception of Cat No 381/A09–0042, which has numerous weaving errors, and 197/A8520, in which the threads are unevenly packed, spinning and weaving are mostly regular. While none of the cloths is of the highest quality, the best of them have a pleasant, even appearance. Among these are Cat Nos 104/A9975 (Illus 10, 29) and 105/A10057, which are probably part of the same fabric: the two are unusual among the Perth textiles in that the simple diagonal weave has been varied – in both cases by a reverse in the direction of the twill (Illus 10). This suggests that the cloth had an overall chevron pattern but, if so, the chevron stripes must have been comparatively wide, for on the large



Illus 29 2/2 twill with reverse. Cat No 104/A9975.

piece there are over 80 threads (65mm) beyond the turning point without a further reverse.

As yet there are no 2/2 twills woven entirely from Z spun yarn from other medieval sites in Scotland and only occasional examples from England. From sites in London, three from the second half of the 13th century, 27 from the first half of the 14th century and 37 from the second half of the 14th century are listed by Crowfoot et al (1992, 27). It should be noted that most of these were considered to be worsteds (ibid, 37). In Scotland, fabrics in this category are, however, known from earlier periods: these include three cloths from a cist of probably Viking date at Greenigoe, Orkney (Henshall 1952, 17); the loom-woven part of the undated Orkney hood is a chevron twill of this type (ibid, 10). The tubular selvedge on Cat No 181/A8085 (cf Illus 13) is a feature of ancient origin (although still in use today) recorded elsewhere as early as the Bronze Age (Hald 1950, 427–8).

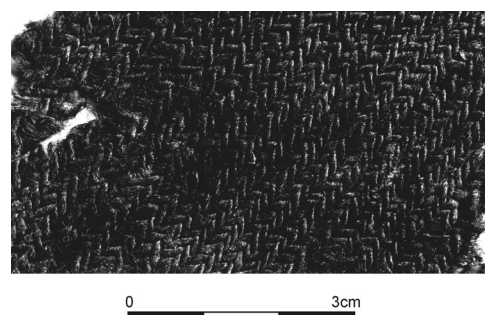
2/2 Twill without nap, ZZ

<i>Cat/Accession</i>	<i>Area</i>	<i>Rig</i>	<i>Feature</i>	<i>Phase</i>
South Sector				
31/A11567b	3	VI	MC037a, Pit 5157	Ia–Ie
33/A11567d	3	VI	MC037a, Pit 5157	Ia–Ie
40/A12342	3	VI	MC037a, Pit 5157	Ia–Ie
89/A10075	4	VI	M1.1c	IId
92/A10193b	4	VI	M1.1c	IId
96/A10624b	4	VI	M1.1c	IId
104/A9975	3	VI	M1.1d	IId,IIe
105/A10057	3	VI	M1.1d	IId,IIe
140/A9522	3	VI	M1.2, Pit 2648	<IIg(IIh)
167/A9056	3	VI	M1.3	IIi
181/A8085	4	VI	M1.4a(a)	IIIa–IIIc
188/A09–0084	9	VII	P8.1c	IIIc
197/A8520	3	V	M6b	IIg–IIId
239/A09–0069	9	VII	B18 (Phase 1/2)	IVaa,IVb
243/A09–0034	9	VII	B18 (Phase 1/2), MF9194	IVaa,IVb
269/A09–0099a	7	VII	B18 (Phase 2b), North Room, Hall & Hall South–Occupation (10)	IVb
356/A6127c	3	V, VI	M1.5a	Va,Vaa(VI)
375/A09–0023a	7	VI, VII	M1.5b	Vaa
381/A09–0042	7	VI, VII	M1.5b	Vaa
409/A09–0009	7/9	VII	Modern, T7014	VI

Three fabrics stand apart from the general description given above. Cat No 89/A10075 is a heavy loose-woven mottled fabric, with a count of 4–5 threads per 10mm in both systems, made from yarn of irregular thickness spun from unsorted fibres. Cat No 96/A10624b is closer-textured and less coarse, but has a careless lumpy appearance, which results from the use of yarn of irregular thickness and tension. Cat No 92/A10193b, which has a closed edge and is probably a discarded selvedge strip, is light weight and moderately well spun and woven. In this case the yarn has a fluffy appearance and the texture is soft, with slight felting on both surfaces. Microscopic examination by Dr Ryder has revealed that the warp and weft yarns were dyed different colours, but too narrow a strip remains to indicate whether this was true of the main part of the fabric.

2/2 Twill without nap, ZS

Two fabrics in this group, Cat Nos 18/A12340a and 82/A12553b, have special characteristics and are considered individually below. The remaining 11 samples, which are drawn from all periods of the site, are of undistinguished appearance. In all cases the yarn in both systems has the appearance of having been combed, and there is no sign of fulling. Mostly the warp and weft are of similar quality (Illus 30), but in three cases (Cat Nos 24/A11551b, 121/A10496 and 205/A09–0133b) the S spun yarn is noticeably thicker and less firmly spun than the Z spun in the other system. Seven of the fabrics are approximately balanced, in the range 6–9 threads per 10mm, while the remainder range from 10–12 by 15 threads to 6–7 by 4–5 threads. All but Cat no 205/A09–0133b are uniform in colour. Of the two subjected to dye analysis, Cat No 24/A11551b was negative, and Cat no 95/A10624a proved to have been dyed with flavanols (see Dyes above); Cat No 361/A6148, examined by Dr Ryder, showed a high level of natural pigmentation.



Illus 30 2/2 twill without nap, ZS.
Cat No 324/A09–0014.

Cat No 18/A12340a comes from a large pit which had been infilled before 1150, and is the one example in wool of diamond twill (Illus 11), a weave more familiar from earlier periods than the medieval. Composed of smooth lustrous yarn, and unfulled, the fabric is comparatively coarse with 6–7 threads per 10mm in both systems. Audrey Henshall (1952, 7, 17) records just two other diamond twills from Scotland – one of the first or second century AD, and the other of probable Viking date – both fine, and of a different pattern. Diamond twills with Z spun yarn in one system and S spun in the other have been found among 10th- to 11th-century material from York (Hedges 1982, 111–13, 126). Most are finer than the High Street piece, but one has a similar count (although a different pattern). In one case the existence of a selvedge has confirmed that the Z spun yarn is the warp. If the same is true of the Perth fragment, the diamonds are symmetrical in the warp but asymmetrical in the weft. By the same reasoning, an interruption of the pattern visible in one area of the fragment may be interpreted as the result of faults when threading the heddles.

Cat No 82/A12553b (Illus 31), deposited just after 1150 within the courtyard of a small backland wattle structure (B4), is notable among the High Street finds in that the warp and weft are of different colours,

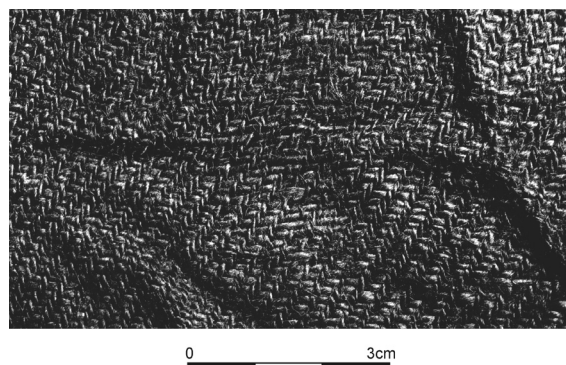
2/2 Twill without nap, ZS.

Cat/Accession	Area	Rig	Feature	Phase
South Sector				
1/A09–0003	4	V, VI	MC004	Ia
9/A8086	1/2	V	B10, South Room–Floor (3)	Icc
18/A12340a	3	V	MC025, Pit 5337	(Ia–)Id
24/A11551b	3	V	MC025, Pit 5337	(Ia–)Id
77/A10417	3	VI	B4, Floor	IIC
82/A12553b	3	VI	B4, ‘Courtyard’–Occupation	IIC
95/A10624a	4	VI	M1.1c	IId
121/A10496	4	V	M10	IId–IIg
205/A09–0133b	7	VI	MC119, Pit 7390	<IIIc–IVa
222/A9902	2	VI	B2, Late Occupation/Abandonment (2) & M1.4d	IVa–IVc
252/A09–0117b	7	VI	M1.4f	IVc
324/A09–0014	9	VII	M9a	IVc, IVcc
361/A6148	3	V, VI	M1.5a	Va, Vaa(VI)

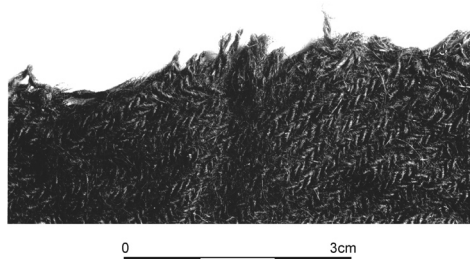
emphasising the diagonal pattern of the weave (although readily visible to the naked eye, this does not show clearly in a black and white photograph). One system, probably the warp, is firmly Z spun dark brown yarn, 11–12 threads per 10mm, and the other a softer and thicker mid-brown S spun yarn, 8 threads per 10mm. No parallel is recorded from the mainland of Scotland, but fabrics of this type are well known in the Nordic sphere in Scandinavia (for example Kjellberg 1979, 89, 103) including, for example, from The Biggings, Papa Stour, Shetland (Walton Rogers 1999, 195) as well as the medieval cemetery at Herjolfsnæs, Greenland (Nørlund 1924, 89–90; Østergård 2009). There are a few fragments with similar characteristics from 14th- and 15th-century levels in London (Pritchard 1982, 199–200) and another, of late 13th- or early 14th-century date, from King's Lynn, Norfolk (Crowfoot 1977, 374–6). These Elisabeth Crowfoot identified as varieties of *vaðmal*, an imported fabric, originally made on the warp-weighted loom in the countries of the north, noticeably Iceland (Hoffmann 1964, 194–226 passim). The piece from King's Lynn, which is exceptionally coarse, is considered to be Icelandic *pakkavaðmál*, so-called because it was used for wrapping more expensive goods. Such a specific identification is not warranted for the Perth fragment, but Dr Hoffmann (pers comm) agreed that it comes under the general heading of *vaðmál*; she commented that although *vaðmál* was often fulled, records also mention unfulled cloth of this type. The Icelandic export of *vaðmál* is reported to have been at its height in the early Middle Ages (Hoffman 1964, 198) but the possibility exists that the Perth fragment may not have come from so far afield. *Vaðmál* is known to have been produced in both Orkney and Shetland (*SND sv wadmál*) and, as late as the end of the 18th century, the memory of weaving *vaðmál* on the warp-weighted loom was still alive in Orkney (OSA, xiv, 319, 324–6). The antiquity of making *vaðmál* in the Northern Isles is not known, but since it was used in payment of *skatt*, a land tax originally imposed during the five centuries of Norse occupation and payable to the earls on behalf of the Norwegian Crown, it must pre-date 1472, when the islands were annexed to the Scottish Crown.

2/2 Twill with nap

The only sample in this category, Cat No 84/A12553d (Illus 32), deposited just after 1150 within the courtyard of a small backland wattle house (B4), is an even, light weight, slightly open-textured cloth, woven from combed



Illus 31 2/2 twill without nap, ZS, *vaðmal*. Cat No 82/A12553b.



Illus 32 2/2 twill with nap, with looped and twisted starting edge. Cat No 84/A12553d.

Z spun yarn. It is remarkable for its shaggy surface, which is quite unlike that on any other textile from Perth. How this nap was formed is not clear. As the fabric does not appear to have been fulled, it is doubtful that it would have been brushed with teasles, a process likely to damage a raw fabric; the nap could perhaps be the result of using wool which has been combed, yet without the short fibres having been removed, or possibly of the conditions in which the piece was buried. An interesting feature, which links the fabric with vertical looms, is a looped and twisted closed edge – not a side selvage but a transverse edge (Illus 15). Somewhat similar, although less complex edges remain on the body and sleeve fabrics of the coarse shirt from Rogart, Sutherland, which may be of medieval date (Henshall 1952, 18–21, Fig 6 and Plate 3); both cloths are tabbies and the sleeve fabric incorporates a pile. Henshall (ibid, 4) considered the possibility that these had been woven on a simple two-beam vertical loom of a type which produced a tubular web. As, however, examples of the latter from northern Europe belong to the prehistoric period, she concluded that the Rogart

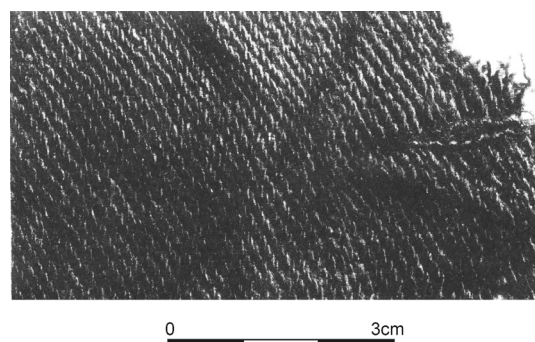
2/2 Twill with nap.

Cat/Accession	Area	Rig	Feature	Phase
South Sector				
84/A12553d	3	VI	B4, 'Courtyard'–Occupation	IIc

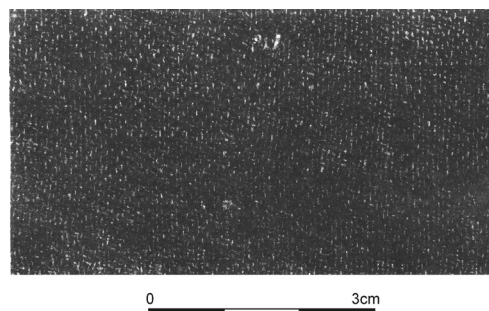
pieces had more likely been woven on a warp-weighted loom: in this case, a heading cord or cords would have been passed through the loops and attached to the top beam of the loom, thus holding the warp ends in place; the cord(s) would have been removed when the finished web was taken from the loom. She commented that the division of the warp threads for the passage of the first weft on the Rogart pieces is haphazard and was presumably done manually after the warp was fixed in place. On the Perth piece, by contrast, the division and arrangement of the warp, although complicated, appears regular and is more likely to have been achieved during warping, although it is difficult to imagine how this was carried out. Dr Hoffmann (1964, 175–82) described and illustrated a number of fabrics begun with a heading cord but all are in tabby weave and, with the exception of a blanket from Thorshavn, in the Faroes, all have simple arrangements at the closed edge. The closest parallel to the Perth piece is a fragment of 2/2 twill from a 13th-century level in Oslo, Norway (Kjellberg 1982, 141), the edge of which is constructed as follows: ‘Between two warp threads connected by a loop there are five single warp threads. These threads are again connected to other warp threads by loops’. The Perth edge is a more complex variation of this set up; the loops are apparently arranged in pairs, but while the two ends of one loop are separated by five other warp threads, those of the other loop have only one warp thread between them. It is understandable that the division of the warp should have been so arranged that the first weft passed through each loop, thus providing proper closure when the putative heading cord (or cords) was removed, but it is not clear why it was necessary to intertwine the warp in so complicated a manner. Such an arrangement might have been necessary when setting up the warp for a patterned cloth, such as a check but, as far as can be seen, Cat No 84/A12553d is monochrome. For the moment, therefore, the structure of this edge remains a puzzle.

2/1 Twill without nap, ZZ

Typically, the pieces in this group, which consists of 49 samples drawn from all periods, are closely woven from combed yarn and have not been fulled; most are hard or moderately firm to the touch. Cat No 38/A11567i is unusual for its loose texture, and Cat No 349/A6710b for its softness. In general, similar yarn was used for the two systems, and warp and weft counts are close to balance. A notable exception is Cat No 108/A6125 (Illus 33), deposited in a late 12th-century midden, which in continuation of an earlier tradition, is heavily warp-faced on one surface; a thicker yarn was used for the weft (the identification of which is confirmed by the existence of a selvedge),



Illus 33 2/1 twill without nap, ZZ. Cat No 108/A6125.



Illus 34 2/1 twill without nap, ZZ. Cat No 264/A09-0105.

and the count is 18 by 9 threads per 10mm. Another fabric, Cat No 376/A09-0023b, from an early 14th-century midden, has a similar count but it is too small to give an adequate impression of the appearance of the cloth. There are four heavy fabrics, with 4–7 threads per 10mm in both systems, but the majority are of light or light-medium weight, with a preponderance of fine cloths with counts in the range 12–24 threads per 10mm. Most are very competently executed, evenly spun and woven (for example Cat No 264/A09-0105, Illus 34) – more consistently well made, indeed, than any other group from the site. Six fabrics have selvages remaining, all simple except that on Cat No 32/A11567c which is tubular (compare with Illus 13). Of three moderately fine fabrics tested for dyes Cat Nos 69/A11510b and 279/A09-0056a were positive for flavanols, but Cat No 196/A09-0123 was completely negative; Cat No 38/A11567i, the soft fabric mentioned above, which at 24 by 18–19 threads per 10mm had the highest thread count in the group, was positive for madder; Cat No 349/A6710b, similar but less fine, examined by Dr Ryder, showed signs of a dark red dye; while Cat No 98/A10332, one of the heaviest fabrics, with a count of 4–7 by 5–6 threads per 10mm, gave no indications of having been dyed.

2/1 Twill without nap, ZZ.

<i>Cat/Accession</i>	<i>Area</i>	<i>Rig</i>	<i>Feature</i>	<i>Phase</i>
South Sector				
†8/A12612B	1/2	V	B10, South Room–Occupation (2b)	Icc
27/A09–0026b	3	V	MC025, Pit 5337	(Ia–)Id
32/A11567c	3	VI	MC037a, Pit 5157	Ia–Ie
38/A11567i	3	VI	MC037a, Pit 5157	Ia–Ie
39/A11567j	3	VI	MC037a, Pit 5157	Ia–Ie
41/A11524	3	VI	MC037b, WW5121	Ib–If
59/A11142	3	VI	MC053c	If
69/A11510b	3	VI	P5.3b	If,IIa
91/A10193a	4	VI	M1.1c	IId
94/A10193d	4	VI	M1.1c	IId
98/A10332	3	VI	M1.1c, Pit 5005	IId
108/A6125	2	VI	M1.1d & M1.1e	IId–IIIf
111/A6649	2	V	B5, North Room–Floor/Occupation (1)	IIa–IIff
113/A8863a	2	V	B5, North Room–Floor/Occupation (2)	IIa–IIff
144/A10409a	3	VI	M1.2, Pit 2648	<IIg(IIh)
170/A09–0142	9	VII	B19 (Phase 1), North Room–Occupation (4b)	IIla
190/A09–0130	7	VI	M6a	IIg–IIId
191/A09–0058	9	VII	M15	IIId
193/A09–0081	9	VII	M15	IIId
196/A09–0123	7	VII	M15; Pit 9415	IIId
206/A09–0134a	7	VI	MC119, Pit 7390	<IIIc–IVa
207/A09–0134b	7	VI	MC119, Pit 7390	<IIIc–IVa
211/A9903a	3	V	P2.2b	IVa
224/A09–0075a	9	VII	B18 (Phase 1b), North Room–Floor	IVa,IVaa
225/A09–0075b	9	VII	B18 (Phase 1b), North Room–Floor	IVa,IVaa
226/A09–0120	7	VII	B18 (Phase 1b), North Room–Occupation (5b)	IVa,IVaa
253/A09–0126	7	VI	M1.4f	IVc
254/A09–0119a	7	VI	M1.4f	IVc
264/A09–0105	7	VII	B18 (Phase 2a), External 1, Pit 7314	IVb
276/A09–0045	9	VII	B18 (Phase 2b), North Room, Hall & Hall South–Occupation (10)	IVb
279/A09–0056a	9	VII	B18 (Phase 2b), North Room, Hall & Hall South–Occupation (10)	IVb
284/A09–0027	9	VII	B18 (Phase 2b), North Room, Hall & Hall South–Occupation (10)	IVb
286/A09–0022	9	VII	B18 (Phase 2b), Hall & Hall South–Occupation (12a)	IVb
287/A09–0039	9	VII	B18 (Phase 2b), Hall & Hall South–Occupation (12a)	IVb
288/A09–0092a	7	VII	B18 (Phase 2b), North Room & Hall–Floor (2)	IVb
314/A6708	3	V, VI	M1.4c	IIIa–IVcc
321/A09–0051	7	VII	M9a	IVc,IVcc
322/A09–0076	7	VII	M9a	IVc,IVcc
325/A09–0080	10	VIII	M9b(b)	IVc,IVcc
334/A6652b	3	VI	B34, Floor	Va
338/A09–0050	7	VI	B34–Courtyard	Va
340/A09–0054	7	VII	P8.4	Va
349/A6710b	3	V	B1(a), T2477	IVcc,Va
350/A6695	3	V	B1(a), Levelling	IVcc,Va
367/A6648	3	V, VI	M1.5a	Va,Vaa(VI)
371/A6146	3	V, VI	M1.5a	Va,Vaa
376/A09–0023b	7	VI, VII	M1.5b	Vaa
380/A09–0037	7	VI, VII	M1.5b	Vaa
404/A1268	2	V, VI	Unstratified	u/s

† indicates item is not listed in original site Finds Register

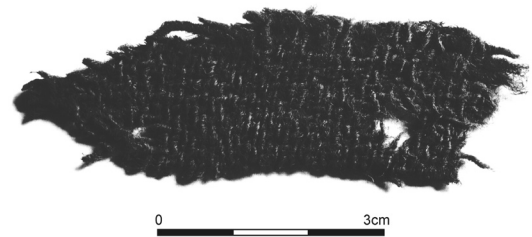
2/1 Twill without nap, ZS

With 87 samples this is the most numerous category from the site. About one third of the fabrics appear to have been fulled, although it may be that the felting together of the yarns is in some cases the result of the conditions in which they were buried (see Finishing, above). In a majority of the samples the S spun yarn is of a different quality to the Z spun; it is usually less firm and often less regular in thickness and tension. These characteristics are especially noticeable among the fulled fabrics, where in most pieces combed Z spun yarn in one system is combined with S spun yarn, which is woollen (or at least lacking the qualities of combed yarn), in the second. Most of the 2/1 twills from 14th-century deposits on archaeological sites in London have Z spun warp and S spun weft. Like the earlier Perth examples, the warp yarn was probably combed prior to spinning; it is smooth and fine. Equally, the weft often has less twist than the warp. Crowfoot, Pritchard and Staniland (1992, 31) comment that because of the longer weft spans on the face of the fabric with the weft floats, the cloth has become matted and woolly.

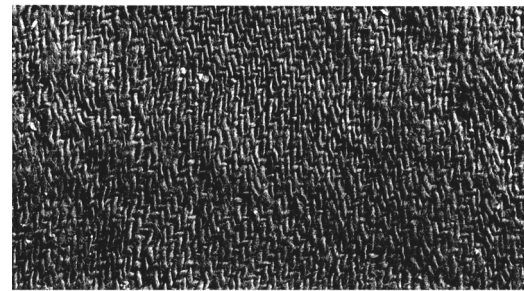
Only five PHSAE pieces in this category have closed edges, but in four – Cat Nos 14/A11080b, 97/A09–0001, 184/A09–0106 and 390/A09–0146 – the Z spun yarn runs parallel to the side selvedge and is, therefore, the warp; the Z spun is also the warp in the fifth sample, Cat No 282/A09–0077a (Illus 35), if the heavy threads at the closed edge may be interpreted as heading cords rather than side strengthening (see Selvedges, above).

There are a few fine unfulled cloths of good quality (for example Cat Nos 294/A6128, 310/A6653b, 311/A6653c and 332/A6151); they are closely woven from worsted yarn, in the range 15–20 threads per 10mm in one or both systems. There is a similar cloth, softer but also made entirely from combed yarn, among the fulled fabrics (Cat No 392/A09–0013). But the majority are heavier, many in the range 8–13 threads per 10mm, and of moderate or even poor quality. Whether unfulled (for example Cat No 100/A11550, Illus 36 or fulled (for example Cat No 337/A09–0041, Illus 37) – albeit 337/A09–0041 has mixed spinning – they have an undistinguished appearance and a tendency to irregularity in both spinning and weaving. The colour too is often uneven and few samples appear to have been dyed. Of twelve examined by Dr Whiting only two proved positive: Cat Nos 177/A09–0108 dyed with indigotin and 372/A8880 dyed with flavanols; Dr Ryder noticed a ‘yellow discolour’ in both the warp and the weft of Cat No 158/A8432, but its origin is unknown.

An unusual fabric in this group is Cat No 97/A09–0001, which was deposited in a Rig VI backland midden late in the 12th century. In this unfulled piece the hard combed warp is so closely packed as to cover the softer combed weft on both surfaces, giving the fabric an almost polished appearance. The use of fine worsted yarn, close weaving, and a high proportion of warp to weft threads (26 by 10) links the Perth



Illus 35 2/1 twill without nap, ZS, with ?heading cords. Cat No 282/A09–0077a.



Illus 36 2/1 twill without nap, ZS, not fulled. Cat No 100/A11550.

piece with some earlier fabrics of exceptional quality, including a group, of the 9th to 10th centuries, from Birka, Sweden (Geijer 1938, 22–9), and another of the 9th to 11th centuries recently found in York (Hedges 1982, 102–4). These fabrics, which have been the subject of considerable discussion as to their origin (for example Hoffman 1964, 239–46; Geijer 1980, 211–13), are, however, mainly diamond twills and Z spun in both systems. A 2/1 diamond twill of comparable quality has been recovered from a grave of possible 12th-century date at Coldingham Priory, Berwickshire.

A coarser warp-faced diagonal twill, Cat No 108/A6125 (Illus 33), discussed among the 2/1 ZZ weaves from Perth, was deposited in the latter half of the 12th century. It also represents a continuity with previous tradition.

2/1 Twill without nap, others

Only one of the four fabrics has been fulled (Cat No 337/A09–0041). At first sight, this fulled textile appears to be a 2/1 twill without nap, ZS. However, a closer examination of the yarns used in system 1 shows that for every 12 to 14 Z spun elements, there are two S spun elements interspersed in fairly regular succession across the width (Illus 37).

Of the unfulled fabrics, Cat No 259/A09–0104 (Illus 38), from the second half of the 13th century, shares

2/1 Twill without nap, ZS.

<i>Cat/Accession</i>	<i>Area</i>	<i>Rig</i>	<i>Feature</i>	<i>Phase</i>
South Sector				
2/A9992	1	VI	MC006, T3852	Ib
13/A11080a	3	V	MC025, Pit 5337	(Ia–)Id
14/A11080b	3	V	MC025, Pit 5337	(Ia–)Id
60/A11143	3	VI	MC053c	If
81/A12553a	3	VI	B4, ‘Courtyard’–Occupation	IIc
90/A10076	4	VI	M1.1c	IId
97/A09–0001	4	VI	M1.1c	IId
100/A11550	3	VI	M1.1c, Pit 5005	IId
127/A9478c	4	VI	B12, Pit 2345	IIe–IIg
130/A8833	4	VI	B12, Occupation (1/2)	IIe–IIg
132/A9129	3	VI	M1.2, Pit 2648	<IIg(IIh)
134/A9271	3	VI	M1.2, Pit 2648	<IIg(IIh)
139/A9506	3	VI	M1.2, Pit 2648	<IIg(IIh)
147/A10409d	3	VI	M1.2, Pit 2648	<IIg(IIh)
149/A10409f	3	VI	M1.2, Pit 2648	<IIg(IIh)
154/A9121	3	VI	M1.2, Pit 2648	<IIg(IIh)
158/A8432	3	VI	M1.3	IIi
160/A8505b	3	VI	M1.3	IIi
161/A8725	3	VI	M1.3	IIi
165/A9138	3	VI	M1.3	IIi
169/A9057b	3	VI	M1.3	IIi
177/A09–0108	9	VII	B19 (Phase 2a), North Room–Occupation (3c)	IIIb
184/A09–0106	9	VII	B19 (Phase 2b), North Room–Floor (1)	IIIc
192/A09–0078	9	VII	M15	IIId
198/A9497	3	VI	MC119, Pit 7390	<IIIc–IVa
199/A9766a	3	VI	MC119, Pit 7390	<IIIc–IVa
200/A9766b	3	VI	MC119, Pit 7390	<IIIc–IVa
201/A9766c	3	VI	MC119, Pit 7390	<IIIc–IVa
208/A09–0135a	7	VI	MC119, Pit 7390	<IIIc–IVa
210/A09–0135c	7	VI	MC119, Pit 7390	<IIIc–IVa
212/A9903b	3	V	P2.2b	IVa
218/A6634	1	VI	B20, Occupation (1a)	<IIId–IVaa
219/A11662	1	VI	B20, Occupation (2b)	<IIId–IVaa
220/A09–0139	7	VII	MC130	<IIIc–IVaa
229/A6124b	4	VI	MC160, Pit 2232	IVb
242/A09–0033	9	VII	B18 (Phase 1/2), MF9194	IVaa,IVb
244/A09–0062	9	VII	B18 (Phase 1/2), MF9194	IVaa,IVb
245/A09–0100	7	VI	M1.4f	IVc
247/A09–0113	7	VI	M1.4f	IVc
248/A09–0114	7	VI	M1.4f	IVc
249/A09–0115	7	VI	M1.4f	IVc
251/A09–0117a	7	VI	M1.4f	IVc
255/A09–0119b	7	VI	M1.4f	IVc
275/A09–0032b	9	VII	B18 (Phase 2b),North Room, Hall & Hall South–Occupation (10)	IVb
278/A09–0049b	9	VII	B18 (Phase 2b),North Room, Hall & Hall South–Occupation (10)	IVb
280/A09–0056b	9	VII	B18 (Phase 2b),North Room, Hall & Hall South–Occupation (10)	IVb
282/A09–0077a	9	VII	B18 (Phase 2b),North Room, Hall & Hall South–Occupation (10)	IVb
289/A09–0092b	7	VII	B18 (Phase 2b), North Room & Hall–Floor (2)	IVb

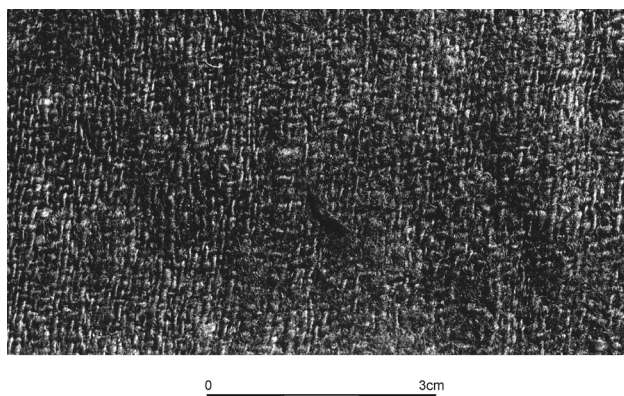
(continued)

2/1 Twill without nap, ZS (continued).

<i>Cat/Accession</i>	<i>Area</i>	<i>Rig</i>	<i>Feature</i>	<i>Phase</i>
291/A09-0038	9	VII	B18 (Phase 2b), Hall South–Occupation (13a)	IVb
293/A9127	3	V	MC155, Pit 2691	IVb, IVc
294/A6128	3	VI	M1.4d	IVb, IVc
304/A12372b	3	VI	M1.4d, Pit 2566	IVb, IVc
305/A03-0253	7	VI	M1.4h	IVc
309/A6653a	3	V, VI	M1.4c	IIIa–IVcc
310/A6653b	3	V, VI	M1.4c	IIIa–IVcc
311/A6653c	3	V, VI	M1.4c	IIIa–IVcc
319/A09-0010	9	VII	P8.3	IVc, IVcc
320/A09-0085	7	VII	M9a	IVc, IVcc
328/A6631	3	VI	M1.4e, Pit 2446	IVcc(Va)
331/A6152	2	VI	B34, MF2759	Va
332/A6151	3	VI	B34, Floor	Va
333/A6652a	3	VI	B34, Floor	Va
335/A09-0052	7	VI	B34–Courtyard	Va
348/A6710a	3	V	B1(a), T2477	IVcc, Va
354/A6127a	3	V, VI	M1.5a	Va, Vaa(VI)
357/A6127d	3	V, VI	M1.5a	Va, Vaa(VI)
359/A6145a	3	V, VI	M1.5a	Va, Vaa(VI)
360/A6145b	3	V, VI	M1.5a	Va, Vaa(VI)
363/A6150	3	V, VI	M1.5a	Va, Vaa(VI)
364/A6626	3	V, VI	M1.5a	Va, Vaa(VI)
368/A8861	3	V, VI	M1.5a	Va, Vaa(VI)
372/A8880	3	V, VI	M1.5a	Va, Vaa
373/A09-0017	7	VI, VII	M1.5b	Vaa
374/A09-0019	7	VI, VII	M1.5b	Vaa
378/A09-0072a	7	VI, VII	M1.5b	Vaa
379/A09-0072b	7	VI, VII	M1.5b	Vaa
382/A09-0064	7	VI, VII	M1.5b	Vaa
386/A09-0036	7	VII	M8a	Va, Vaa
388/A09-0015	9	VII	M8a	Va, Vaa
389/A09-0074	7	VII	M8a, T7206	Va, Vaa
390/A09-0146	7	VII	B53 (Phase 1), Central Area–Occupation (2a)	Vb
392/A09-0013	7	VII	B53 (Phase 1), North Area–Occupation (4)	Vb
394/A09-0016	7	VII	B53 (Phase 2), North Area–T7072	Vbb
395/A09-0025	7	VII	B53 (Phase 2), South Area–Occupation (6)	Vbb
396/A09-0012	7	VII	B53 (Phase 2), North Area–Occupation (15)	Vbb
399/A8910	2	VI	P1b	Vd
North Sector (Area 6)				
411/A6147	6	–	‘Garden’	G

2/1 Twill without nap, others.

<i>Cat/Accession</i>	<i>Area</i>	<i>Rig</i>	<i>Feature</i>	<i>Phase</i>
South Sector				
93/A10193c	4	VI	M1.1c	IId
168/A9057a	3	VI	M1.3	IIi
259/A09-0104	7	VII	B18 (Phase 2a), North Room & Hall–Construction (1)	IVb
337/A09-0041	7	VI	B34–Courtyard	Va

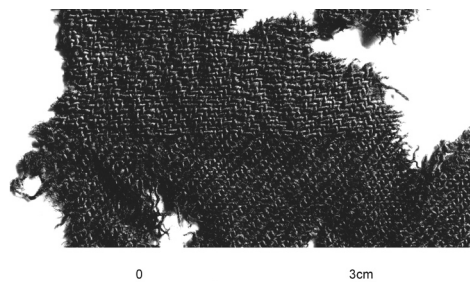


Illus 37 2/2 twill without nap, others (mixed spinning in the system with the vertical elements), fullled. Cat No 337/A09–0041.

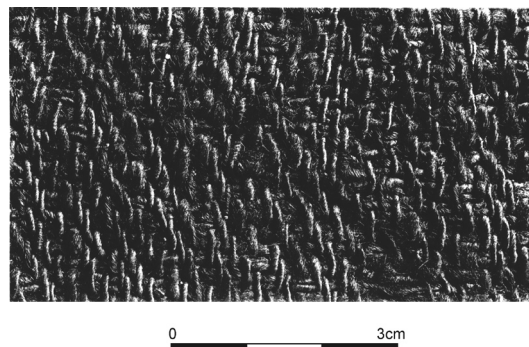
the characteristics of many of the three-shed twills woven from Z spun yarns. The cloth, which is harsh to the touch, is closely woven from well made worsted yarn; the thread count is 15–18 per 10mm in both warp and weft. The unusual feature is that whereas in one system Z spun yarn is used throughout, in the other it is used for only part of the fragment, the remainder being executed in similar S spun yarn. The change to a yarn spun in the opposite direction creates a noticeable difference in texture, but insufficient of the fabric remains to show whether this was part of a regular pattern. If the Z and S spun threads in this second system were originally of different colours, this is no longer evident, as the piece is a uniform dark brown. Cat No 168/A9057a (Illus 39), deposited c1200, is a heavy fabric in which the weave is extended in one system (see Weaves and patterns, above); each pair of threads consists of one Z spun and another similar, but S spun. Cat No 93/A10193c (Illus 9), from the second half of the 12th century, is also a partially extended weave, but in this case threads running in pairs and thicker single threads are used in the same system. The fragment is notable as being the only example of a check from the High Street site, although again too little remains to give an adequate impression of the pattern.

2/1 Twill with nap, ZZ.

<i>Cat/Accession</i>	<i>Area</i>	<i>Rig</i>	<i>Feature</i>	<i>Phase</i>
South Sector				
37/A11567h	3	VI	MC037a, Pit 5157	Ia–Ie
126/A9478b	4	VI	B12, Pit 2345	Ile–IIg
148/A10409e	3	VI	M1.2, Pit 2648	<IIg(IIh)
162/A10070	3	VI	M1.3	IIi
185/A09–0096	9	VII	B19 (Phase 2b), North Room–Floor (2b)	IIIc
273/A09–0024	9	VII	B18 (Phase 2b), North Room, Hall & Hall South–Occupation (10)	IVb
355/A6127b	3	V, VI	M1.5a	Va, Vaa(VI)
365/A6627	3	V, VI	M1.5a	Va, Vaa(VI)



Illus 38 2/1 twill without nap, others, with change in one system from Z and S threads in ?weft. Cat No 168/A9057a.



Illus 39 Extended 2/1 twill without nap, others, with paired Z and S threads in ?weft. Cat No 168/A9057a.

2/1 Twill with nap, ZZ

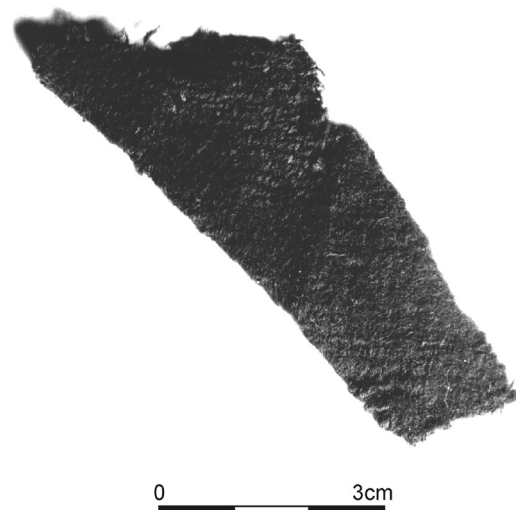
The eight fabrics in this category are heterogeneous. The two earliest samples, Cat Nos 37/A11567h and 126/A9478b, are made from combed yarn and have much in common with the un-napped 2/1 twills constructed from Z spun yarn; despite the presence of a light nap on one or both surfaces, they do not appear to have been fullled. In the remaining six cloths the yarn in one or both systems is comparatively soft and was probably not prepared by combing. All six have been fullled, although the degree of fulling varies from light in Cat No 185/A09–0096 to heavy in 273/A09–0024. In Cat No 365/A6627, the fabric with the highest count in the group, 18 by 17 threads per 10mm, the surface has been sufficiently heavily finished as to render the identification of the weave slightly doubtful.

2/1 Twill with nap, ZS

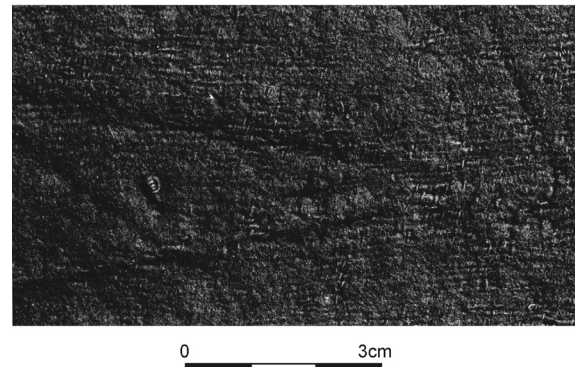
All 62 samples in this group have been fullled. Like the 2/1 ZS weaves, without nap, there is often a disparity in quality, texture, or both, between the Z and S yarns. In any given fabric the Z spun yarn is usually, although not invariably, the more firmly spun and with the higher count. On only three pieces, Cat Nos 74/A11154, 145/A10409b and 257/A09–0131, is the selvedge preserved, but in all three cases the Z spun yarn is the warp. The selvedge is simple in Cat No 257/A09–0131 but in Cat No 74/A11154, the weave has been extended, that is, the warp threads run in pairs, for a width of 7mm. In Cat No 145/A10409b the weave is also extended, in that the warp threads are grouped in pairs for a width of 10mm, but the interlacing employed in the selvedge is tabby.

The degree to which the nap has been raised varies considerably. Eighteen of the pieces, the earliest of which, Cat No 83/A12553c, comes from the courtyard occupation of a backland house (B4) that dated from after 1150, have been heavily napped on both surfaces, often to the extent of totally obscuring the structure of the cloth (for example Cat No 297/A8101; Illus 40). Where, as is often the case, fulling has also been extensive, the texture of the fabric is very firm. On those pieces where the nap has partially worn away, allowing the threads to be examined, the count varies from 10 by 6 to 14 by 12 threads per 10mm. About a further dozen of the cloths are either napped on one side only, or have been more heavily napped on one surface than the other: in each case, (for example Cat Nos 19/A12340b and 290/A09–0093; Illus 41, 43), the nap is more prominent on the surface on which the S threads predominate. The raising of the nap on this surface in Cat No 22/A12340e converts the stripes into a more indistinct and mottled effect. Thread counts are in the range 8 by 8 to 17 by 13 per 10mm.

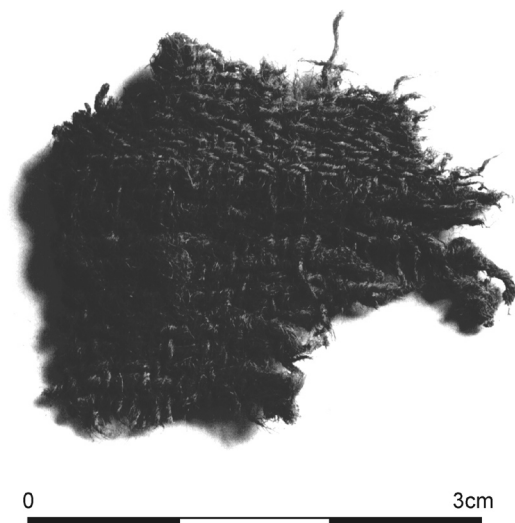
The remaining samples, constituting nearly half the group, have a light nap on both surfaces; most have between 8 and 14 threads per 10mm in both systems. Cat No 128/A9481, with a count of 7–8 by 4 threads, is unusual for its coarseness and mottled colouring. In Cat No 283/A09–0077b (Illus 42), from the second half of the 13th century, the main S spun yarn is replaced in part by a group of considerably finer and very closely-packed S spun threads. The sample is fragmentary and in a poor state of preservation, but may have been a weft striped fabric, analogous with the tabby and twill cloths patterned with extended tabby stripes, of the 13th to 15th centuries, known from England, the Netherlands, and elsewhere (Crowfoot 1980, 112–13; Pritchard 1982, 200 Fig 1; Vons-Comis 1982a, 156, Fig 1; Walton 1989, Fig 161a). In the Perth piece, however, the basic three-shed construction seems to have been retained for the stripe(s), the effect depending on the change of yarn and the close packing of the threads; the colour of both wefts is now the same.



Illus 40 2/1 twill with nap (partially worn), ZS. Cat No 297/A8101.



Illus 41 2/1 twill with nap, ZS. Cat No 290/A09–0093.



Illus 42 2/1 twill with nap, ZS, with ?weft stripe of finer yarn. Cat No 283/A09–0077b.

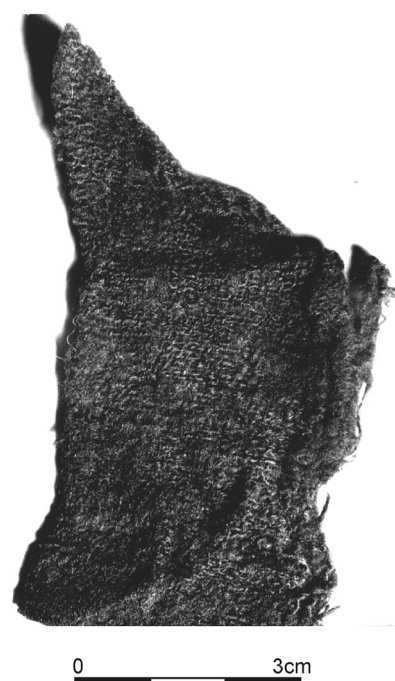
2/1 Twill with nap, ZS.

<i>Cat/Accession</i>	<i>Area</i>	<i>Rig</i>	<i>Feature</i>	<i>Phase</i>
South Sector				
19/A12340b	3	V	MC025, Pit 5337	(Ia-)Id
22/A12340e	3	V	MC025, Pit 5337	(Ia-)Id
58/A09-0011	3	V	MC034a	Ie(If)
70/A11510c	3	VI	P5.3b	If,IIa
74/A11154	3	VI	MC048	(Ia-)IIa-IIc
83/A12553c	3	VI	B4, 'Courtyard'-Occupation	IIc
99/A10787	3	VI	M1.1c, Pit 5005	IId
110/A9901	3	VI	M1.1e	IIf
114/A8863b	2	V	B5, North Room-Floor/Occupation (2)	IIa-IIff
115/A8871	2	V	B5, North Room-Floor/Occupation (2)	IIa-IIff
116/A6716	2	V	B5, North Room-MW3587	IIa-IIff
125/A9478a	4	VI	B12, Pit 2345	IIe-IIg
128/A9481	4	VI	B12, Pit 2345	IIe-IIg
138/A9326	3	VI	M1.2, Pit 2648	<IIg(IIh)
141/A9536a	3	VI	M1.2, Pit 2648	<IIg(IIh)
143/A9536c	3	VI	M1.2, Pit 2648	<IIg(IIh)
145/A10409b	3	VI	M1.2, Pit 2648	<IIg(IIh)
146/A10409c	3	VI	M1.2, Pit 2648	<IIg(IIh)
155/A11288	3	VI	M1.2, Pit 2648	<IIg(IIh)
163/A8832	3	VI	M1.3	IIi
164/A9108	3	VI	M1.3	IIi
176/A09-0110	9	VII	B19 (Phase 2a), North Room-Occupation (3c)	IIIb
178/A09-0111	9	VII	B19 (Phase 2a), North Room-Occupation (3c)	IIIb
182/A09-0094	9	VII	P8.1b & B19 (Phase 2b), South Room-Occupation (1a)	IIIc
186/A09-0086	9	VII	B19 (Phase 2b), North Room-Occupation (3)	IIIc
187/A09-0091	9	VII	B19 (Phase 2b), South Room-Occupation (2a)	IIIc
189/A09-0089	9	VII	P8.1c	IIIc
195/A09-0083	9	VII	M15	IIId
209/A09-0135b	7	VI	MC119, Pit 7390	<IIIc-IVa
213/A9905	3	V	P2.2b	IVa
215/A09-0057	9	VII	B18 (Phase 1a), Middle Room/Hall-Occupation (1b)	IVa,IVaa
228/A6124a	4	VI	MC160, Pit 2232	IVb
230/A6124c	4	VI	MC160, Pit 2232	IVb
231/A9906	4	VI	MC160, Pit 2232	IVb
236/A09-0124c	7	VII	MC126, Pit 7402	IVaa,IVb
241/A09-0067	9	VII	B18 (Phase 1/2)	IVaa,IVb
257/A09-0131	7	VII	B18 (Phase 2a & 2b), T7385	IVb
258/A09-0103	7	VII	B18 (Phase 2a), North Room & Hall-Construction (1)	IVb
260/A09-0030	9	VII	B18 (Phase 2a), North Room & Hall-Construction (1)	IVb
263/A09-0102	7	VII	B18 (Phase 2a), North Room & Hall-Construction (2)	IVb
277/A09-0049a	9	VII	B18 (Phase 2b), North Room, Hall & Hall South-Occupation (10)	IVb
281/A09-0071	9	VII	B18 (Phase 2b), North Room, Hall & Hall South-Occupation (10)	IVb
283/A09-0077b	9	VII	B18 (Phase 2b), North Room, Hall & Hall South-Occupation (10)	IVb
290/A09-0093	7	VII	B18 (Phase 2b), North Room & Hall-Floor (2)	IVb
297/A8101	3	VI	M1.4d	IVb,IVc
298/A8515	3	VI	M1.4d	IVb,IVc
301/A8097a	3	VI	M1.4d, Pit 2566	IVb,IVc
302/A8097b	3	VI	M1.4d, Pit 2566	IVb,IVc

2/1 Twill with nap, ZS (continued).

<i>Cat/Accession</i>	<i>Area</i>	<i>Rig</i>	<i>Feature</i>	<i>Phase</i>
303/A12372a	3	VI	M1.4d, Pit 2566	IVb, IVc
315/A7352a	3	V, VI	M1.4c	IIIc–IVcc
316/A7352b	3	V, VI	M1.4c	IIIc–IVcc
318/A7424	3	V, VI	M1.4c	IIIc–IVcc
326/A7616	3	VI	M1.4e	IVcc(Va)
329/A6644	3	VI	P6	IVcc, Va
347/A8859	3	VI	P6 & B1(b), Destruction	IVcc, Va
369/A8911	3	V, VI	M1.5a	Va, Vaa(VI)
377/A09–0060	7	VI, VII	M1.5b	Vaa
385/A09–0040	7	VII	M8a	Va, Vaa
397/A6709	2	V, VI	M4a	Vaa–Vc(VI)
402/A09–0028	10	VIII	B51, T7008	Vd, Vdd
405/A2827	3/4	V, VI	Unstratified	u/s
408/A09–0066	7–10	VI–VIII	Unstratified	u/s

In general the quality of the cloths in this category is rather higher than that of the 2/1 ZS weaves without nap, especially among the more heavily finished fabrics. This particularly applies to colour, which is often rich and even, suggestive of dyeing; a number of the pieces have a distinct pink or red tinge. An offcut of a high quality fabric, Cat No 138/A9326, is characterised by its deep red colour and even spinning in both warp and weft. The fragment with the strongest and clearest colour, Cat No 19/A12340b (Illus 43), one of the earliest fabrics from the site, was found by Professor Whiting to have been dyed with kermes (see Dyes above). Three others (Cat Nos 213/A9905, 230/A6124c and 297/A8101) have been dyed with madder, and a fourth (Cat No 301/A8097a) with both madder and indigotin. In addition, Cat No 302/A8097b was noted by Dr Ryder to be pale yellow in both systems, and it is recorded that Cat No 397/A6709 ran red when being washed during conservation. Two other samples examined by Professor Whiting, Cat Nos 114/A8863b and 187/A09–0091, proved negative.

**2/1 Twill with nap, others**

These two fabrics are considered separately because of the unusual combinations of yarn used in their manufacture, but their general appearance is also unlike the other 2/1 twills with nap. Both are from late 12th century Rig VI middens. Cat No 142/A9536b, of which only a few square centimetres remain, is a full, medium weight fabric with eight threads per 10mm in both systems, and has a moderate nap on both surfaces. It is one of only two cloths from the site constructed entirely from S spun single ply yarn. The rarity of the SS combination among medieval wool cloths, at least before the 15th century, has been noted elsewhere; in a substantial collection of finds from Lund, Sweden, for example, it is reported to disappear entirely after the early 1100s (Lindström 1982, 182). However, post-11th-century and pre-15th-century 2/1 twills

Illus 43 *2/1 twill with nap, ZS, dyed with kermes. Cat No 19/A12340b.*

with S spun warp and weft do make rare appearances at archaeological sites as previously discussed (see Spinning, above).

Cat No 157/A8366 is a strip of stiff heavy weight fabric with one long edge closed. It has been so thoroughly finished that the analysis can only be tentative. As far as can be seen, it is an extended weave, the weft consisting of fine S spun threads used in pairs. The warp exhibits a curious combination of loosely twisted 2 ply yarns – some Z spun and S plied and others S spun and Z plied. The piece is narrow, no more than 25mm, and it is possible that this is special structure for a selvedge rather than that of the main fabric. Heavily reinforced edges with paired and plied warp elements were detected among fulled cloths from the Castle Ditch, Newcastle upon Tyne. These borders have been interpreted as strengthened selvedges for stretching the cloth on tenter frames to dry after fulling (Walton 1981, 195–7). However, it should be noted that there is a considerable lapse of time between Cat No 157/A8366, dating to the late 12th century, and the 15th- to 16th-century textile assemblage from Newcastle. Another 15th-century textile, 753C, a tabby felted on both sides, has a simple selvedge of four Z plied yarns at Fast Castle, Berwickshire (Ryder and Gabra-Sanders 1992, 6; Gabra-Sanders and Ryder 2001, 127).

Twill weaves of silk

P Z Dransart

Of the four silk twill weaves recovered from the High Street, the two earliest were recovered from deposits laid down shortly before 1150. The other two came from Rig VII contexts dating from the second half of the 13th century and first decade or so of the 14th century. Three of the silks in this category are weft-faced compound twills, while the fourth (Cat No 233/A09–0122) is a 2/2 lozenge twill (Illus 47, 48).

In their present condition, the High Street twill weaves are small and somewhat disparate in shape: Cat No 342/A09–0088 is a sample consisting of two small triangular fragments, Cat Nos 6/A9500 and 46/A7323 are similar narrow bands, while Cat No 233/A09–0122 is a larger piece of fabric, evidently very worn when it entered the archaeological deposits. They do, however, testify to the variety of silk fabrics imported into Scotland and complement finds from other medieval sites.

Weft-faced compound twill is a textile structure with a widespread geographical distribution; it occurs in three of the silk twill weaves from the High Street. It was also long lived, although less so than the tabby used in the silks discussed above (see Tabby weaves of silk). Often referred to by the medieval term *samitum*, weft-faced compound weaves were perhaps developed in Iran during the second and third centuries AD (Geijer 1979, 58). Compound weaves are woven with two warp sets which function, respectively, as a main warp and as a binding warp. The main warp may be used singly, in which case there is a proportion of one main warp end to each binding end. Alternatively, there may be one pair of main ends to each binding end. The existence of two functionally distinct warp systems in one fabric suggests that the drawloom was employed, with the figure harness controlling the main warp ends and the ground harness the binding ends (ibid, 58 and 101). Movements of the main warp ends determine the order in which different wefts appear on the surface, but these warp threads are largely obscured by the weft floats. Weft-faced compound weaves are ideally suited for executing complex designs and they formed the predominant technique for patterned silks in the first millennium AD (ibid, Plates 12–22). However, they were still current in the 12th to 14th centuries, to judge from textiles excavated from various medieval centres in Britain. In addition to Perth, they have been found at, for example, Southampton (Crowfoot 1975), Winchester (Crowfoot 1990) and London (Crowfoot et al 1992).

2/1 Twill with nap, others.

<i>Cat/Accession</i>	<i>Area</i>	<i>Rig</i>	<i>Feature</i>	<i>Phase</i>
South Sector				
142/A9536b	3	VI	M1.2, Pit 2648	<IIg(IIh)
157/A8366	4	VI	M1.3	Ili

Twill weaves of silk

<i>Cat/Accession</i>	<i>Area</i>	<i>Rig</i>	<i>Feature</i>	<i>Phase</i>
South Sector				
6/A9500	1	V, VI	B15(West/East), PH3792	Ic,Icc
46/A7323	2	VI	M14b(b)	Ie
233/A09–0122	7	VII	MC126, Pit 7402	IVaa,IVb
342/A09–0088	7	VII	P8.4	Va

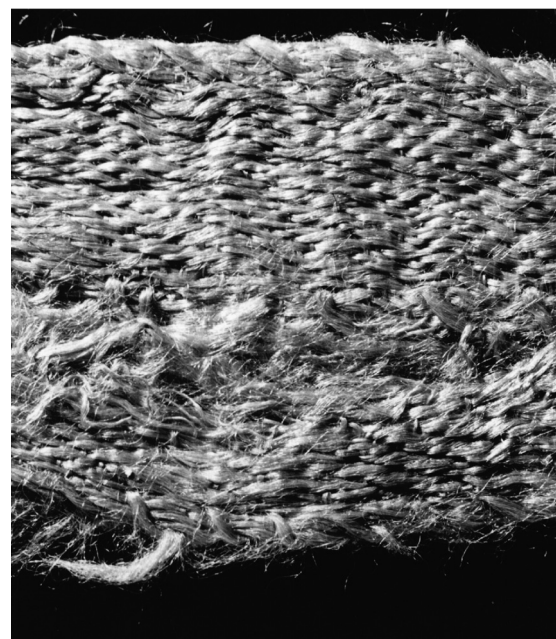
Two of the High Street pieces, Cat Nos 6/A9500 and 46/A7323 (Illus 44), share similar characteristics. In these long strips of cloth, there are two wefts, one on each surface of the fabric. The weft travels under one and over two binding warp ends (that is, a $1/2$ order of interlacing). Since the binding warp forms longer floats on one side of the fabric (the reverse), the two faces are not exactly the same. In this twill structure, the main warp is all but obscured (Illus 45). Closer examination indicates that there is a proportion of one main warp to each binding end in these two pieces. Both the warps in each piece are Z thrown, while the weft is untwisted and of a coarser diameter. However, slight differences in thread densities may be noted. Cat No 6/A9500 has a warp count of 16 binding warp ends and 16 main warp ends per 10mm, and a weft count of 24 threads per 10mm on each surface of the fabric. In contrast, Cat No 46/A7323 has a count of 14–15 warp threads of each type, and a weft count of 18 threads per 10mm on each surface.

Both pieces probably served a similar purpose as the binding or edging of a garment, or perhaps as tapes. One long margin on Cat No 6/A9500 is deteriorated and the constructional details of Cat No 46/A7323 are clearer (Illus 46).

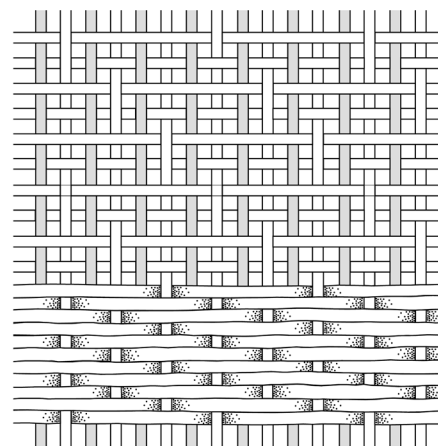
The third weft-faced compound twill from the High Street (Cat No 343/A09–0088) is structurally similar to the other two. It differs in that the ridges formed by the twill weave constitute a Z diagonal. In the case of Cat Nos 6/A9500 and 46/A7323, the ridges form S diagonals. The colour is different too, being a dark golden yellow instead of the brighter yellow which characterises the two strips. It has a warp count of 17 binding warp ends and 17 main warp ends per 10mm. There are 24 weft passes per 10mm.

As mentioned above, weft-faced compound weaves constitute an ideal medium for complex patterning. A fragmentary silk fabric from Milk Street, London, was executed in a $1/2$ weft-faced compound twill with red, white and blue weft threads, dating from the late 9th to 10th centuries (Pritchard 1984, 61–2). Unlike the Perth weft-faced compound twills, the threads used in the main warp and binding warp are not twisted. From a slightly later archaeological context (late 10th to early/mid 11th century) at 16–22 Coppergate, York, there is a reliquary pouch, the outer covering of which was woven in a similar compound twill. Although both main and binding warps are Z thrown, as in the Perth compound twills, there is a difference in that the York reliquary pouch has a main warp which is paired (Walton 1989, 369–71).

The fact that the Perth weft-faced compound twills have a single rather than paired main warp ends means that they are slightly unusual in 12th- to 14th-century contexts. Parallels may be noted, however. Two fragments assigned to the 11th to 12th century from the treasury at Beromünster share similar characteristics (Schmedding 1978, Cat Nos 20a and 20b). In these two rectangular shaped silks, the wefts on each face are of a different colour. In No 20a at Beromünster, the weft



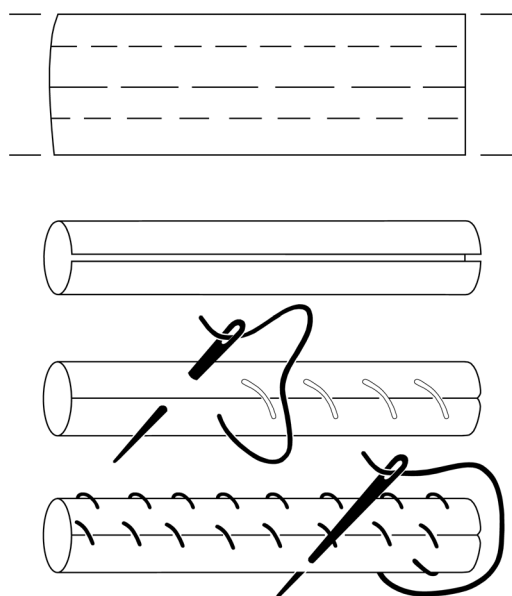
Illus 44 *Twill, silk, weft-faced compound twill with single main warp ends. Cat No 46/A7323.*



Illus 45 *2/1 weft-faced compound twill.*

on the upper surface is violet, and that on the lower surface is green-blue. The two colours appearing on the upper and lower surfaces of No 20b are light violet and dark violet, respectively. These two fragments share the same structural characteristics displayed by Cat Nos 6/A9500 and 46/A7323, but the warp and weft counts are much higher.

Monochrome samitum is said to be rare (ibid, 37). It has been found as a lining material in St Cuthbert's grave, Durham (Flanagan 1956, 525). It also constitutes the ground of another St Cuthbert fabric, the so-called Rider silk, which has a printed design (Brett 1956). In addition, it was employed in an embroidered chasuble



Illus 46 Detail of construction of Cat No 46/A7323.

ascribed to St Thomas of Canterbury in the Cathedral of Fermo, Italy; the fabric is blue on the upper surface and white on the lower (Schuette and Müller-Christensen 1963, Plates 57–59). This silk has an inscription which dates it to AD 1116 and which further assigns it to Almería, a noted Spanish weaving centre (May 1957, 10).

Various explanations have been offered to account for the contrast between the choice of single or paired main warp threads in weft-faced compound twills. According to one suggestion, a proportion of one main warp thread to one binding thread is found in earlier fabrics; the development of paired main warp ends permitted the weavers to use finer yarn, thereby affording better weft cover (Flanagan 1956, 507–8, Footnote 3). Further examples of the use of a single main warp are known from fragments, originally dyed red, found in the tomb of ?Henry of Blois (d 1171) in Winchester Cathedral (Crowfoot 1990, 486 No 1039) and in a weft-faced compound twill found during excavations at Lower Brook Street, Winchester. In this second example the warp was probably dyed with weld, and the wefts formed some kind of pattern in yellow and red (ibid, 482 No 1020).

Another proposition is that paired main warp ends have greater design potential in that a smaller design may be enlarged (Flanagan, cited in Walton 1989, 377). It has also been suggested that fabrics with single main ends were suitable for embroidery, as in the embroidered buskins of Archbishop Hubert Walter (d 1205) at Canterbury Cathedral (Muthesius 1982b, 84). The High Street compound twills, however, have survived in a monochrome condition.

Not all weft-faced compound twills have a 1/2 order of interlacing. A single main warp twill, excavated from a late 13th-century level at site Trig Lane, London, is a 1/3 weft-faced compound twill (Crowfoot et al

1992, 107 and Fig 77). In other words, the weft passes under one binding warp and over three. Like the Perth compound weaves, it is monochrome in colour. The Trig Lane silk consists of five small pieces of fabric, sewn together to make what looks like the upper part of a bag or pouch (ibid, 104).

In Scotland, an example of a 1/3 weft-faced compound twill has been analysed from an early or mid 16th-century bishop's tomb at Fortrose (Henshall et al 1956, 26–8). The cloth is patterned in a repeated fleur-de-lys design with two wefts, an untwisted silk yarn and a badly deteriorated pattern weft, which was possibly of vegetable fibre originally twisted with a metal strip. However, this textile is significantly different from the fragments excavated from the High Street and Kirk Close sites in Perth. The ground warp is paired in a proportion of two main warp ends to each binding end. In addition, both warps are fine, lightly S thrown silk. It has been suggested that generally, with few exceptions, silk yarns employed in the west were Z thrown until the 14th century (or the end of the 13th century in Italy), when technological advances in reeling and throwing silk resulted in a change to the production of fine S twisted warp yarns (Crowfoot et al 1992, 124). A silk velvet from Fast Castle in Berwickshire, from a late 15th-century context, has a main warp which is S thrown (Pritchard in Ryder and Gabra-Sanders 1992, 9, and in Gabra-Sanders and Ryder 2001, 129). However, there are some cases of narrow silk ribbons with an S thrown warp which predate the 14th century (see Tabby weaves of silk, above).

Compound weaves may also be woven on the basis of a tabby rather than a twill binding. An extremely high quality textile woven in such a compound weave was exhumed from the presumed tomb of Robert I (the Bruce) in Dunfermline Abbey when it was opened in 1819, although there is a slight possibility that the grave may have contained the body of Alexander III, who died in 1286 (Henshall et al 1956, 22 n1). According to the analysis undertaken by Beckwith and Kerton (ibid, 22–6), the structure of the textile consists of a brocaded tabby, the tabby binding being employed in the ground, the pattern and the brocade. Three pairs of ground warp are used for each binding warp, all Z thrown silk (the binding warp only has a slight twist). There are three wefts; the ground weft is of untwisted silk, the pattern weft consists of a gilt metal strip twisted S on a plied linen core, and the brocade weft is also of untwisted silk. Since the metal is woven throughout the fabric, Beckwith and Kerton identified it as cloth of gold. Probably dating from the early 14th century or late 13th century, the textile is thought to be a product of a loom in northern Italy (ibid, 26).

The fourth silk twill excavated from the High Street is Cat No 233/A09–0122 (Illus 47, 48). This 2/2 twill has reversals in both directions, creating an overall lozenge pattern. With a firm Z thrown warp and untwisted weft, it has a warp count of 35–38 threads and a weft count of 25–27 threads per 10mm. These counts are fairly similar to those of a silk cloth in the

treasury at Chur, Switzerland (Schmedding 1978, 88 Cat No 90). The Chur piece is large, and it is crossed with bands of coloured silk wefts and gold threads with a linen core. However, the main weave is a lozenge twill with a firm Z thrown warp and a loose Z twisted weft; both warp and weft are white. Schmedding (*ibid*, 88) assigned it to 13th-century Spain.

Other lozenge twill silks include a cushion found in the tomb of Queen Berenguela (d 1246) at the convent of the monarchs of Castile and León at Las Huelgas, near Burgos, Spain (Gómez-Moreno 1946, Plate LXVIII no 21), and a rectangular satchel in the treasury of St Servatius, Maastricht (Stauffer 1991, Cat No 84). Both these textiles are crossed by transversal bands of colour; the latter has a Z thrown warp and an untwisted weft like Cat No 233/A09–0122. In the light of these examples, it is significant that the High Street lozenge twill was recovered from deposits dating to the second half of the 13th century

The fragmentary Trig Lane pouch mentioned above also came from a 13th-century context. In spite of the 2/2 and 1/3 interlacings used, respectively, in the compound twills of Cat No 233/A09–0122 and of this pouch, a point of comparison may be made in the loose texture that both display. The use of fine threads in a loosely textured weave is characteristic of another type of 13th-century silk cloth known as cloth of aresta (Desrosiers et al 1989, 223 n10). Of note is a silk recovered from excavations at Kirk Close in Perth belonging to this category (Muthesius 1987, 169–71; Illus 49). The term cloth of aresta is derived from the Latin *pannus de arista*. One of the features of such cloths is the incorporation of a chevron or herringbone twill, hence the Latin term *arista* which, besides meaning an ear of corn, may also be applied to fishbone or herringbone. The reverses in direction across the width of the fabric of the diagonal ridges of the chevron twill correspond to individual repeats of one straight comber unit and one in reverse, in which the direction of the diagonal lines in the twill is changed (Desrosiers et al 1989, 210–11). In the Kirk Close textile the points of the chevrons meet in a vertical band embellished with a large lozenge which separates pairs of confronted birds. A fuller definition has been proposed to account for the technical features of cloth of aresta in the following terms: ‘Figured two-sided weft-faced lozenge and diagonal twill weaves, with 2 or 3 lats [wefts], the third lat brocaded or interrupted’ (*ibid*, 213). These textiles always have a warp proportion of one end. In other words, there is only a main warp, since a binding warp is not used. However, Desrosiers et al (*ibid*, 213) note that the term ‘two-sided’ does not, strictly speaking, always hold true. Some examples of cloth of aresta are not fully reversible because the third lat creates a ‘right’ and a ‘wrong’ surface, or else a tabby may occur on one side as in the Kirk Close textile. In cloth of aresta with a lozenge twill ground, ‘the reverse of the cloth always corresponds to the side on which these lozenges are formed by the longer floats’. The Kirk Close textile has such a lozenge ground, but it should be noted that the



Illus 47 *Twill, silk, with lozenge pattern.*
Cat No 233/A09–0122.



Illus 48 *Detail of twill, silk, with lozenge pattern.*
Cat No 233/A09–0122.

criterion adopted by Desrosiers et al for distinguishing the right surface has been described as side two by Muthesius (1987, 169).

In the dual classification proposed by Desrosiers et al, the Kirk Close textile belongs to Category 1, more precisely, to sub-group 1(L8) because of its ground weave, which is a 'two-sided weft-faced lozenge twill, with a repeat of 8 warp threads and 8 passes' (Desrosiers et al 1989, 215). The birds and vertical bands are executed in two consecutive twill weaves which interlace 5/1 and 3/1/1/1 (Muthesius 1987, Illustration 95). Unlike the 1(L8) textile from the Musée Historique des Tissus, Lyon, illustrated by Desrosiers et al (1989, Figure 2), which has three lats (the third lat interrupted), and is a polychrome textile, the Kirk Close textile has two wefts and the cloth is monochrome, the Z thrown warp and untwisted wefts being golden yellow in colour.

Cloth of aresta is thought to have been woven in Spain in the 13th century (May 1957, 87–8; King 1968, 29). More recently, Desrosiers (1999, 114) has suggested that Category 1 textiles might have been produced in Languedoc, which had links at that time with the Aragonese crown. It is therefore interesting to note the 14th-century archaeological context from which the Kirk Close example was excavated. Such a textile would have been highly prized. It is also possible that sumptuary laws imposed restraints on the wearing or use of such a luxury product. The earliest surviving sumptuary law in Scotland is dated to the 15th century; it gave permission to knights or lords and members of their families to wear silk (see Dress in medieval Perth, below). Hence the Kirk Close silk may have been an heirloom before being finally discarded.

A fascinating point of comparison may be made between this textile and the pewter token (A9279) from the High Street (see PHSAE Fascicule 2, The metalwork). The token came from a context dated to the third quarter of the 13th century, and it shows two addorsed birds, their heads turned backwards towards each other; they are depicted pecking the fruit of a three-branched tree which is centrally placed. Although the birds on the Kirk Close textile are confronted, they too, peck at the leaves or fruit of a three-branched tree. It should be noted that the drawing of the textile in Muthesius (1987, Illus 95) is not accurate in this respect. In both the token and the textile, the birds are stylised, but Bateson suggests that the birds on the token may represent peacocks, in which case the triple branched tree may symbolise the true vine (Christ). The peacocks would then stand for the immortality granted to those who feed from it; in other words, the textile and the token may have been seen as an allegory of the Eucharist (see Fascicule 2, The metalwork, Devotional objects, for further details). Such pewter tokens were actually cast in Scotland, but the textile is perhaps an Aragonese import.

Amongst the cloth of aresta recovered from the royal tombs at Las Huelgas is a textile with pairs of confronted, but backward looking birds (Gómez-



Illus 49 Detail of silk twill with bird design from Kirk Close, Perth, Cat No 29. (Copyright Perth Museum and Art Gallery)

Moreno 1946, Plate LXXIa). Manuel Gómez-Moreno placed both lozenge twills, like Cat No 233/A09–0122, and cloth of aresta in a category he designated as the 'Christian Series', noting the influence of the Mudéjar style (that is, art executed by Muslims under Christian rule) in the treatment of the arch portrayed in heraldic shields on the cloth of aresta in the tomb of Alfonso VIII (ibid, 57). Peacock motifs, as in the Kirk Close textile, constitute an artistic theme explored by both Muslims and Christians. A stucco ceiling incorporating peacocks at the convent of Las Huelgas has been attributed to the work of stucco carvers from Andalucía in the 13th century, which at that time was under Muslim control (May 1957, 52–5). Hence the peacock was used as a symbol in both Islamic and Christian iconographic canons.

In addition to the silks represented amongst the High Street textiles, few other types of weave have been found on Scottish sites. A narrow silk strip was recovered from a Phase 1 pit at Queen Street, Aberdeen, dating from the second half of the 13th century. It is 8mm wide with one side selvedge intact. Along this closed edge there is a tabby border of 10 warp threads, but the main weave is a warp-faced satin, interlacing 4/1 and with the ridges forming an S diagonal (Bennett

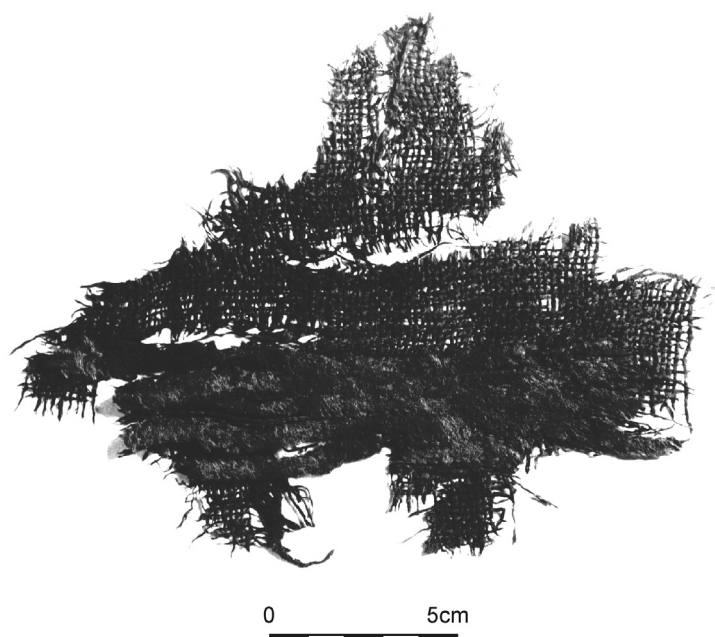
1982, 199). Technically, satin is a five-end weave which is particularly suited to silk as the weave enhances the glossiness of the fibre. Satin continued to be used in Scotland as demonstrated by a dark reddish brown silk cloth, probably a 1/4 weft-faced twill with a very shallow Z diagonal from the tomb of Gavin Dunbar, Archbishop of Glasgow (d 1547) (Henshall et al 1956, 28–9). The chronological aspects concerning the twist direction of the constituent yarns in these different categories of silk textiles will be reviewed with reference to the Perth tabbies and twills in the General discussion, below.

The presence of imported silks in Scottish burghs, of which Perth has provided most examples, extends the range of imported textiles already known from the work of Henshall et al (1956). In addition, the archaeological contexts demonstrate that silks were

used in a wider social sphere than one might suppose from a study of surviving silks in Western treasuries alone. The High Street silks demonstrate the prosperity of at least some of its inhabitants, from the earliest days of the burgh. They also indicate that Perth burgesses were part of the extensive trading networks which were operating in Europe and further afield.

Carpet

The fragment of carpet with its tabby base of jute or sisal, and pile coloured with modern dye, is certainly of recent manufacture. A photograph (Illus 50) has been included as an illustration of how radically the appearance of a textile may be affected even by a relatively short period of burial.



Illus 50 Carpet (*modern*). Cat No 403/A11083.

Carpet.

<i>Cat/Accession</i>	<i>Area</i>	<i>Rig</i>	<i>Feature</i>	<i>Phase</i>
South Sector				
403/A11083	1	VI, VII	Unstratified	u/s