Late Saxon Textiles from the City of London

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ARCHAEOLOGICAL EXCAVATIONS in the City of London have produced an important collection of late 9th- to early 12th-century textiles manufactured from wool, goat hair, silk and flax. The production processes associated with the different types of cloth are here described, together with details of weaving techniques and dyeing practices. Changes in the types of cloth used in the 11th century are related to the introduction of new technology and the decline in use of the warp-weighted loom. Evidence is examined for the local manufacture of cloth and for the import of foreign silks. Lastly, attention is drawn to the similarity of the London textiles to those found in other regions of northern Europe.

I. INTRODUCTION

Many historians and archaeologists have lamented that the direct evidence for textiles from late Saxon England is pitifully slight. Recent urban excavations have, however, yielded an increasing quantity of textile fragments.[1] These textiles provide a rich source of new information about cloth manufacture and the different types of cloth produced, and enable comparisons to be made with cloth recovered from contemporary sites on the Continent.

All the textiles considered here were recovered from excavations undertaken in the City of London by the Department of Urban Archaeology, Museum of London, between 1976 and 1979. They come from deposits which date from the late 9th century to the early 12th, and this stratification makes it possible for changes to be identified in the types of cloth used during the 250-year period. The variety of cloths in wool, silk and linen suggests a greater degree of affluence among the citizens than is, for instance, apparent from ground plans and kitchen ware. They also emphasize how cosmopolitan were textile trade and exchange. Reconsideration of some less precisely dated artefacts found in the 19th and early 20th centuries has also added to the evidence for textile manufacture in the City.[2]

The textiles were recovered from two sites, Milk Street and Watling Court, situated in the western part of the City on side streets leading into the Saxon market street of West Cheap (Cheapside) (Fig. 1).[3] Most came from rubbish pits positioned along the boundaries of neighbouring properties.

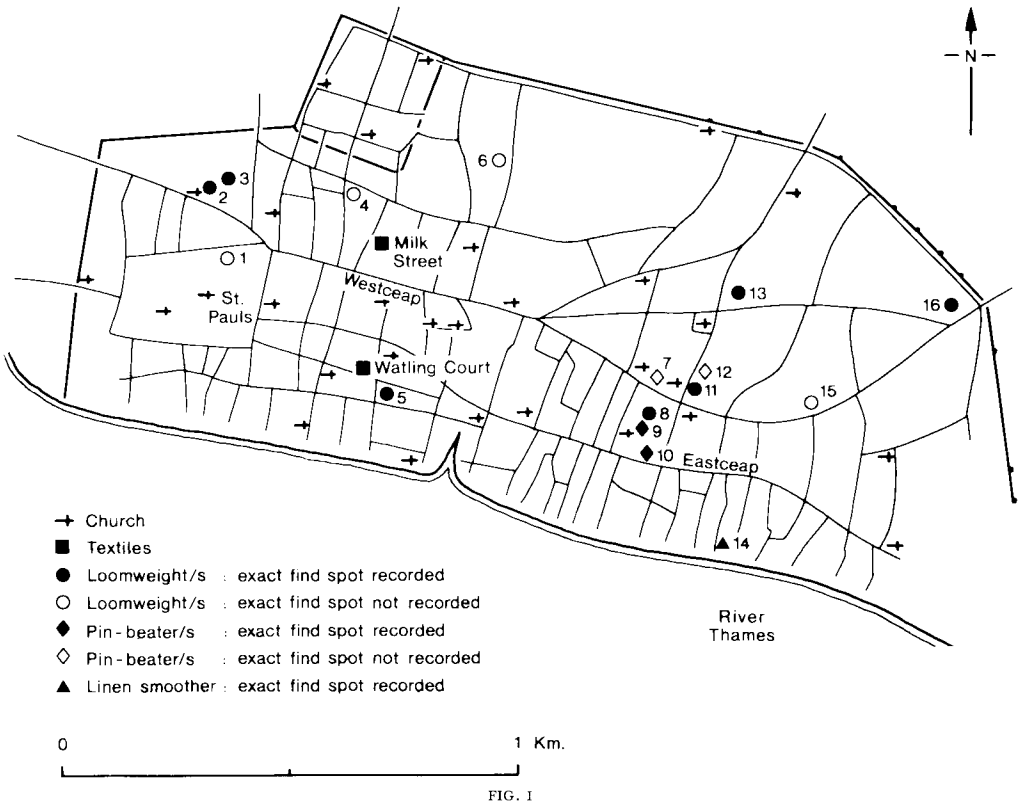

FIG. 1

Map of London *c.* A.D. 1100 showing find locations of the textiles and textile implements. 1: Paternoster Row; 2: GPO site, Newgate St (GPO 75); 3: GPO St Martin's le Grand; 4: Lad Lane (formerly part of Gresham Street); 5: Cannon Street (CS 75); 6: Moorgate; 7: Lombard Street; 8: Corner of King William Street and Sherborne Lane; 9: Phoenix House, King William Street; 10: Nos. 61–66 King William Street; 11: 79 Gracechurch Street (ACE 83); 12: Gracechurch Street; 13: Lloyds site, Leadenhall Street; 14: St Botolph's Lane (PEN 79); 15: Fenchurch Street; 16: Holy Trinity Priory (HTP 79)

The pits at Milk Street, of which 112 were investigated, have been divided into five chronological groups on the basis of pottery evidence.[4] Textiles were recovered from Groups Two to Five, the dates assigned to each being late 9th to 10th century; late 10th century; 11th to early 12th century; and mid to late 12th century respectively: Groups Two to Four yielding 36 textiles are studied here.[5] The pits in Groups Two and Three appear to have been used for domestic refuse but a number of the Group Four pits, some of which were wicker-lined, could originally have served a different purpose.[6] A late 10th-century pit at Watling Court produced one further fragment of cloth. In addition to the textiles found in pits, a strand of silk was discovered on the floor of a late 10th-century 'sunken-floored' building at Milk Street, while fragments of three pieces of cloth and a few loose wool yarns were recovered in a very decayed condition from the floorboards of an 11th-century 'large-cellared' building at Watling Court.[7] No particular status can be ascribed as yet to either of the two types of building.

II. THE TEXTILES

Method of treatment

On recovery, each textile was given a site excavation number and approximate dimensions were recorded. The fragments from waterlogged deposits were kept damp and placed with a solution of fungicide (sodium orthophenylphenate) in heat-sealed polyethylene bags with waterproof (tyvec) labels. They were then immediately sent to the Museum of London Conservation Laboratory where each fragment was supported on glass and washed with non-ionic detergent and water. Where the dirt proved too intransigent to dislodge with a soft brush, weak washing solutions of disodium EDTA or sodium hexametaphosphate were tried, but discontinued for fear of removing any remaining traces of dyestuffs. After rinsing, each fragment was placed on sheets of blotting paper. Threads were carefully straightened and the cloth allowed to dry slowly at room temperature beneath a thin plate of glass. The condition of some pieces is very brittle but others retain much of their original elasticity. All are stained various shades of brown except for the patterned silk where areas of red colouring are still visible. The textiles are, at present, placed in boxes lined with acid-free tissue paper in a humidity controlled store. Methods of mounting the textiles, to enable them to be viewed without handling, are under investigation.

Method of analysis

Whole mounts of the fibres were prepared using 'Styrolite' as a plastic mounting medium (refractive index = 1.524).[8] The fibres were then examined under a low (× 100) and a high (× 400) power. Cross-sections of the silks and goat hair were made and identified by specialists from the Metropolitan Police Forensic Laboratory and the British Museum (Natural History). For analysis of the fleece types, diameter measurements were carried out on a random selection of 100 fibres per sample.

The cloth was examined both by eye and by binocular microscope up to × 40 magnification. Characteristics of the yarn, weave, spacing of the threads, finish and sewing were recorded and, where enough cloth survived, small lengths of yarn were removed for dye analysis.

A. WOOL TEXTILES

Textiles woven from wool form 74% of the total assemblage. Since the size of the fragments varies between 15 × 15 mm and 86 × 350 mm only a limited analysis of the cloth is possible in some instances. Each is described below in the order of the production processes employed for the manufacture of the cloth.

Fleece types and wool selection (Figs. 2 and 3)

The fleece quality is of utmost importance to the finished product. This quality is largely determined by breed but the level of nutrition, the health of the individual animal and climatic conditions also have an effect.[9]

To learn more about the fleeces used, 49 wools from 24 pieces of cloth were sampled for fleece types, 45 from late 9th- to late 10th-century deposits, the remainder from late 11th- to early 12th-century (see Appendix). Fleece types were determined from the range of fibre diameters and their distribution according to Dr M. L. Ryder's system of classification.[10] The results show that six different fleece types are present (Fig. 2) and, with the exception of the shortwool, they correspond to the range of types identified from a contemporary (9th- to 11th-century) group of

Fleece type	No.	% of total	Overall diameter range*	Mode		Mean diameters		% Medullated	
				Range	Mean	Range	Overall mean	Range	Mean
Hairy	3	6.1	12–132	20–24	21.3	25.0–29.7	27.5	0– 9	7
Hairy medium	30	61.2	12– 96	20–32	24.3	22.9–37.6	30.0	0–18	5.2
Generalized medium	7	14.3	12– 54	16–20	18.0	20.0–27.4	24.6	0– 7	2.8
Fine generalized medium	2	4.1	12– 40	16	16	20.7–22.6	21.6	0	0
True medium	6	12.3	12– 64	28–32	30.6	28.3–36.5	31.5	0– 9	3.3
Shortwool	1	2.0	14– 44	28		26		7	

* Diameter measurements are recorded in microns. 1 micron=0.001 mm

FIG. 2

Table summarizing fleece types and wool fibre diameter measurements

Fleece type	75%+ pigmented	11—25% pigmented	1—10% pigmented	No pigment	Total
Hairy	–	–	2	1	3
Hairy medium	4	2	10	14	30
Generalized medium	–	1	4	2	7
Fine generalized medium	–	–	–	2	2
True medium	–	1	4	1	6
Shortwool	–	–	1	–	1

FIG. 3

Table showing the extent of natural pigmentation in the different fleece types

textiles from York.[11] There is no evidence from the London samples that a particular fleece type was used for a particular quality of cloth nor are any differences apparent between the two chronological groups. The predominance of the 'hairy medium' wools reflects the primitive character of most of the sheep. 'True medium' wool (primitive longwool) and shortwool represent more highly evolved types of fleece and appear not to have become common until the late 15th century.[12]

Since no tips were observed in the examination of nearly 5000 fibres, it is evident that the sheep were sheared rather than plucked and that all the wool used was from mature sheep rather than from lambs.[13] Shearing enables the wool clip both to be transported more easily in bales and to be sorted into grades before processing but it is not possible to deduce from the cloth the regional source of the wool.

The presence of natural pigment in the fibres was also noted and this shows that natural white wool was mainly used (Fig. 3). Only two pieces of cloth were woven from natural brown wool, of which one (Cat. No. 24) is also distinctive for the construction of its weave. The small quantity of natural pigment present in a few other examples would probably not have been visible to the eye. Dyeing in the fleece was a long established practice and the choice of white wool would have enabled the dye to be taken up more effectively: the process of dyeing is considered in greater detail below (see p. 57).

Wool preparation and spinning

There are several grades of yarn present, apparently prepared for spinning in three different ways.

Yarn type 1 is coarse, ranging from 1 to 2.5 mm in diameter, and spun straight from the fleece, after the removal of some dirt and in a few instances dyeing. For a smooth yarn to have been produced by this method, long fibres and a well greased fleece were essential. Most London examples, however, appear to have been drawn out inexpertly, resulting in an uneven yarn with a fluctuating degree of twist, ranging between 15° and 50° (Pl. I, A–C). Yarns falling into this category were spun either with a Z-twist or with an S-twist depending upon whether the spindle was rotated in a clockwise or anti-clockwise direction. The S-spun yarn tends to have been twisted more weakly so that it is softer and fluffier and consequently was used for the weft rather than the warp, since the former would have been under less tension during weaving (Pl. I, A).

Yarn type 2 is a fine lustrous worsted (combed) yarn, used for the better quality cloth. Some is as fine as 0.3 mm, although a diameter of 0.5 mm is more common. The yarn used for the warp was invariably Z-spun with approximately a 45° angle of twist. That used for the weft was generally S-spun with a variable degree of twist. Thus, in some examples, the angle of twist is as low as 15° to 20° (Pl. III, C), while in others it compares with that of the warp (Pl. III, A and D).

Yarn type 3 is a bouncy 'woollen' yarn with a diameter of 1 to 1.5 mm and an angle of twist of between 30° and 45°. To obtain it, short wool fibres would have been teased out by hand into a loose mass or roving and then spun. It is unlikely that the wool would have been carded since there is a lack of evidence for the use of wool cards at this period.[14] Such yarn was only S-spun and confined to the weft (Pls. II, B, C and III, B).

Cloth Structure

Cloth is made by the interlacing of at least two sets of threads in a specific order. One set, the warp, is tied to the loom and kept under tension during weaving. The

Cat. no.	Site	Context no.	Reg. no.	Dimensions (mm)	Yarn type	Spin dir.	Angle of twist	Yarn diameter (mm)
1	MLK 76	1376	779	Largest 25×30	1	Z/S	35°/30°	1/2
2	MLK 76	1376	780	30×102	?	Z/S	30°–40°/30°–45°	0.8/0.4–1
3	MLK 76	1118	789	Largest 60×88	1	Z/S	40°/15°–20°	1/2–2.5
4	MLK 76	1376	776	Largest 52×80	1	Z/Z	50°/50°	1.5–2/1.5–2.5
5	MLK 76	1118	802	Largest 45×30	1	Z/Z	45°–50°/45°–50°	1.5–2.5/1.5–2.5
6	MLK 76	1118	1084	Largest 25×87	1	Z/Z	40°–50°/35°–45	1.5–2.5/1.5–2.5
7	MLK 76	1147	1078B	20×70	1	Z/S	45°/40°	1.5–2/2.5
8	MLK 76	83	30	Largest 115×34	1	Z/S	45°/35°–45°	1–1.5/1.5–2.5
9	WAT 78	829	941	Largest 73×41	2	Z/Z	?	0.5/0.5

Cat. no.	Sett*	Selvedge	S. Border	Cloth Design	Dyestuff/s	Sewing	Pit group	Date
1	6/4	–	–	–	Not analysed	–	2	L9–10
2	10–11/10	?	–	–	None detected	Yes	2	L9–10
3	6/4	?	–	–	Madder	Yes	2	L9–10
4	3/5–6	–	–	Weft stripe (1 throw)	Madder on some threads	–	2	L9–10
5	3/6	?	?	Weft stripe (3 throws)	Not analysed	–	2	L9–10
6	3/5–6	–	–	Weft stripe (1 throw)	None detected	–	2	L9–10
7	?/3	?	–	–	None detected	Yes	3	L10
8	5/3	Yes	Yes	–	Madder	–	4	L11–12
9	13/13	–	–	–	Not analysed	–	–	L11–12

* Number of warp/weft threads per 10 mm. The number of warp, or presumed warp, ends is stated first.

FIG. 4
Table of wool tabbies

other set, the weft, is passed transversely under and over the warp. The system of interlacing (binding) the two sets of threads is known as the weave and the two basic binding systems evident on the textiles described here are called tabby and twill.[15]

i. Tabby weaves (Figs. 4 and 5; Pls. I, A–C and II, A)

Tabby is the simplest weave, where one warp thread (end) crosses over one weft thread (pick) and under the next. In the following row, the order in which the threads cross is reversed.

In this collection there is a total of nine wool tabbies, which represent four different qualities of cloth, but no chronological division is discernible between them (Fig. 4). Four are very coarse, woven from Yarn type I, and have a low density of threads in both systems (Cat. Nos. 1, 3, 7 and 8: Pl. I, A and B). The yarn was Z-spun for the warp and S-spun for the weft. Another three are also coarse and were woven from Yarn type I, but only Z-spun yarn was used (Cat. Nos. 4, 5 and 6: Pl. I, C). These latter three tabbies, all from the same pit, are patterned with stripes produced by the use of paired threads in the weft system, and may represent fragments of the same piece of cloth. The stripes are formed from either one or three rows of paired threads separated by wider bands of single threads, but the design cannot be fully reconstructed because of the small size of the fragments preserved. Yarn of more than one colour was used to accentuate the striped pattern, since on one fragment a dyestuff, madder, has been detected (Cat. No. 4).[16] The dye, however, is not present on any of the paired wefts.

The other two tabbies are balanced weaves and use yarn of a higher count (finer thickness). For one (Cat. No. 9) combed yarn was Z-spun for both the warp and the weft, while for the other Z-spun warp yarn and S-spun weft yarn were employed (Cat. No. 2: Pl. II, A). Poor quality wool seems to have been used for the latter and the weft yarn in particular is uneven and would easily have snapped.

Original edges remain on four of the tabby-woven textiles but they are all poorly preserved and difficult to interpret. On one 11th-century example, two edges are preserved (Cat. No. 8: Fig. 5, A; Pl. I, B). The top (starting) edge consists of a series of 22 closed loops which link together every first and fourth warp end except at the corner where the first and fifth and second and third ends appear to be joined. Each loop is twisted, perhaps resulting from the use of a heading cord, which would have secured the warp to the beam of the loom (Fig. 5, B). The structure of this starting edge could have been produced on any simple type of loom. The side edge (selvedge) is simple and unreinforced.

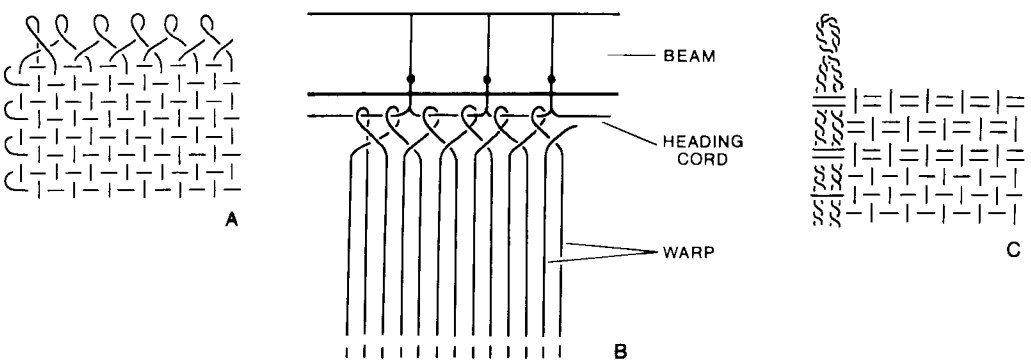

FIG. 5

Diagrams of starting edges and selvedges on the wool tabbies: A. Cat. No. 8; B. Possible reconstruction of cloth on loom; C. Cat. No. 5

Cat. no.	Site	Context no.	Reg. no.	Dimensions (mm)	Yarn type	Spin dir.	Angle of twist	Yarn Diameter (mm)	Sett	Selvedge	S. Border
10	MLK 76	1118	800	Largest 27×112	2/3	Z/S	50°/30°–40°	0.6/1–1.5	11/9	–	–
11	MLK 76	1118	1080	Largest 66×90	2	Z/S	30°/15°–20°	0.5/1	11/10	–	–
12	MLK 76	1118	1547	Largest 24×25	2	Z/S	40°/20°	0.8/1	11/9	–	–
13	MLK 76	1376	777	55×100	2	Z/S	45°/45°	0.4–0.7/0.8–1	14–15/10	–	–
14	MLK 76	1376	778	40×34	2	Z/S	50°/45°	0.5/0.6	13/13–14	–	–
15	MLK 76	1041	47	Largest 45×45	2	Z/S	40°–45°/40°–45°	1/1	9/6	–	–
16	MLK 76	1041	51	Largest 17×30	2	Z/S	50°/45°	1/1	11/11	–	–
17	MLK 76	1118	792	Largest 15×15	2	Z/S	45°–50°/45°	0.5/0.5 and 1.5	10/9	–	–
18	MLK 76	1118	788	66×96	2	Z/S	40°/40°	0.6/0.7	15/13	–	–
19	MLK 76	1118	1083	Largest 27×105	2	Z/S	45°/45°	0.5/0.5	15/14	Yes	–
20	MLK 76	1376	785	Largest 86×350	2	Z/S	40°/40°	0.5/0.5	15/11	Yes (2)	–
21	MLK 76	1376	786	17×82	2	Z/S	45°/45°	0.5/0.6	15/13	Yes	–
22	MLK 76	1215	1132	63×335	2	Z/S	40°/30°	0.5/0.6	16/12	Yes	–
23	WAT 78	2199	588	85×40	2	Z/S	40°/45°	0.4/0.9	14/9	–	–
24	MLK 76	1215	1546	30×185	2/3	Z/S	45°/35°–40°	0.5/1	9/8–9	–	–

Cat. no.	Cloth design	Dyestuff/s	Sewing	Pit group	Date
10	Broken lozenge/pattern unit 10 ends×9 picks	Madder	Yes	2	L9–10
11	Broken lozenge/pattern unit 10 ends×41/33 picks	None detected	–	2	L9–10
12	Broken lozenge/pattern unit 10 ends× ?picks	None detected	–	2	L9–10
13	Broken lozenge/pattern unit 10 ends×9 picks	None detected	–	2	L9–10
14	Broken lozenge/pattern unit 18 ends×9/17 picks	None detected	–	2	L9–10
15	Broken lozenge/no complete pattern unit	None detected	–	2/3	L9–10
16	Broken lozenge/pattern unit ?14 ends× ?picks	Indigotin	–	2/3	L9–10
17	Thicker yarn every 3rd pick	Madder and indigotin	–	2	L9–10
18	Broken chevron/pattern reverses 10×7 ends	None detected	–	2	L9–10
19	Broken chevron/pattern reverses 2/6×7 ends	Lichen purple	–	2	L9–10
20	Broken chevron/pattern reverses 5/6×3/8/4/6×17/2 ends	Indigotin	–	2	L9–10
21	Broken chevron/pattern reverses 6/4/6 ends	?Lichen purple	–	2	L9–10
22	Broken chevron/pattern reverses 1/4/6×17 ends	Indigotin and ?lichen purple	Yes	3	L10
23	Broken chevron/pattern reverses 6×4 ends	None detected	–	–	L10
24	Broken twill/pattern unit 4 ends×4 picks	None detected	?	3	L10

FIG. 6
Table of 2/2 twills

Similarly, part of a starting edge and of a selvedge are both preserved on one of the striped pieces of cloth (Cat. No. 5: Fig. 5, C; Pl. I, C). The edge is reinforced with a plied cord joined at the top in a loop, but no other details survive. Two other tabbies also possess traces of selvedges but both are obscured by sewing (Cat. Nos. 2 and 7).

ii. Four-shed twills (Figs. 6–8; Pls. II, B and III, A–D)

A twill weave is where each warp end passes over or under two or more adjacent weft picks and over or under the next one or more in such a way that the binding points form diagonal lines. A four-shed twill is based on a unit of four warp ends and four weft picks and among these textiles from London there are fifteen such twills, none of which date later than the late 10th century (Fig. 6). All are broken twills with one possible exception where the cloth is too fragmentary to be sure. This means that the diagonal lines of the binding are

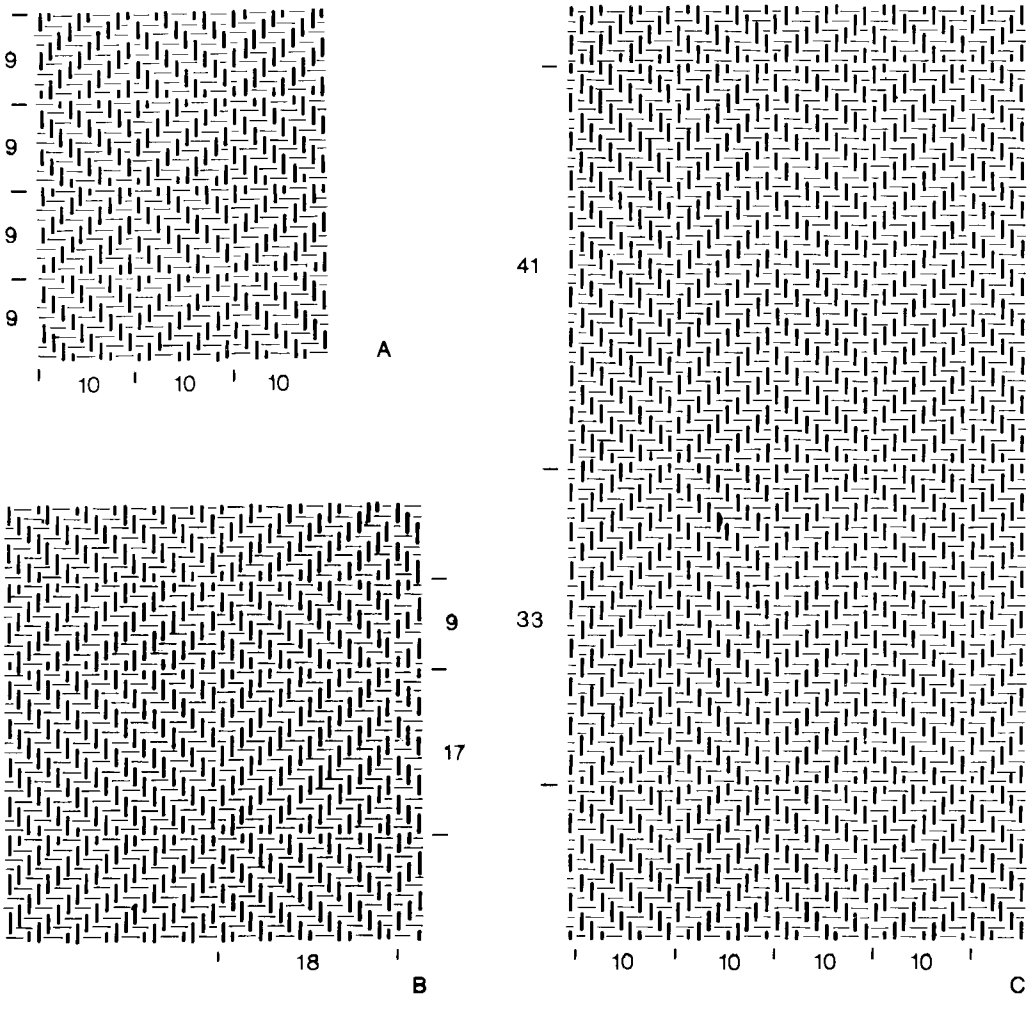

FIG. 7

Weave diagrams of 2/2 broken lozenge twills: A. Cat. Nos. 10 and 13; B. Cat. No. 14 (partly reconstructed); C. Cat. No. 11 (partly reconstructed)

deliberately broken at regular intervals. The binding has been modified to form repeating patterns of either lozenges or chevrons (herringbone) on thirteen of the fifteen examples preserved.

All the four-shed twills are of medium quality and resemble modern tweed. Most of the yarn is combed although in the weft it has usually been less tightly twisted. On two examples teased 'woollen' yarn was used for the weft (Cat. Nos. 10 and 24). Z- and S-spun yarn occur in the opposing warp and weft systems with that employing Z-spun yarn, probably the warp, being slightly closer set.[17]

2/2 broken lozenge twills: There is some pattern variation between the seven 2/2 broken lozenge twills, none of which preserve any trace of a starting border or selvedge. Two have a pattern unit of ten Z-spun threads by nine S-spun threads (Cat. Nos. 13 and 10: Fig. 7, A; Pl. III, A and B). The other examples have larger repeats which cannot be fully reconstructed. On one the pattern reverses after ten Z-spun threads and 41 and 33 S-spun threads, resulting in long, narrow blocks of pattern (Cat. No. 11: Fig. 7, C; Pl. III, C) while on another the reverses fall at irregular intervals in both directions (Cat. No. 14: Fig. 7, B). The pattern of this cloth is partly obscured by a small series of gores inserted to help correct the sagging of the warp when it was being woven.[18]

2/2 broken chevron twills: Four of the six chevron twills preserve simple selvedges indicating that the pattern reverses in the warp. On one piece, a band, the complete loom width of 86 mm is preserved, enabling the whole design to be determined (Cat. No. 20: Fig. 8, B; Pl. III, D). This shows the warp to be composed of 139 ends, divided into 24 stripes with 23 reverses. Most of the reverses fall after six threads but one narrower stripe of four threads and a wider one of eight threads also occur, perhaps caused by a miscalculation in the tie-up on the loom. Near one edge the warp ends became disarranged during weaving, probably due to a broken heddle, and the repair has resulted in a single symmetrical point repeat.[19]

On the other fragments similar self-patterned stripes occur, composed of between four and ten threads. Two pieces had gores inserted to keep the weft straight (Cat. Nos. 18 and 22) but in most respects the cloth is of uniformly good quality.

Other 2/2 twills: Of the other two four-shed twills, one is a 2/2 broken twill woven from natural brown wool (Cat. No. 24: Fig. 8, B; Pl. II, B). The other is characterised by contrasting

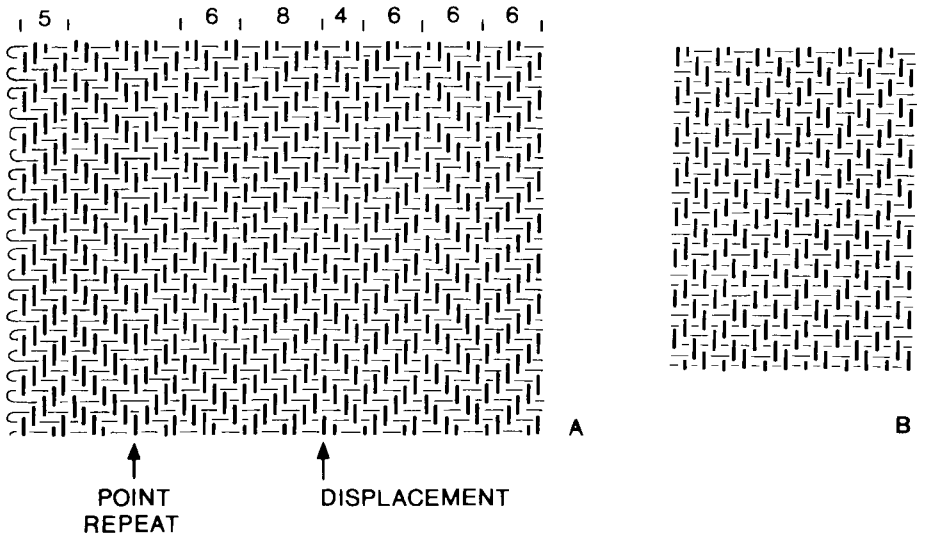

FIG. 8

Weave diagrams of 2/2 broken twills: A. Chevron twill, Cat. No. 20, showing part of cloth design with both point repeat and displacement; B. Cat. No. 24

Cat. no.	Site	Context no.	Reg. no.	Dimensions (mm)	Yarn type	Spin dir.	Angle of twist	Yarn diameter (mm)	Sett	Selv-edge	S.Border
25	MLK 76	1147	1078A	110×90	1	S/S	40°–45°/40°–45°	1–2/1–2.5	4/4	–	–
26	MLK 76	1215	1079	74×270	2/3	Z/S	40°–45°/45°	1/1	9–10/9	–	–
27	MLK 76	3087	309	55×37	2/3	Z/S	40°–45°/40°	0.5–0.7/1.5–2	10/6–7	–	–
28	WAT 78	776	1375	Largest 26×21	2	Z/Z	45°/45°	0.3/0.3	22/14	–	–
29	WAT 78	776	615	Largest 65×65	2	Z/S	45°/45°	0.3/0.3	28/19	–	–

Cat. no.	Cloth design	Dyestuff/s	Sewing	Pit group	Date
25	–	None detected	Yes	3	L10
26	–	None detected	Yes	3	L10
27	–	None detected	–	4	L11–12
28	Lozenge/no complete pattern unit	Indigotin and madder	–	–	L11–12
29	Lozenge/pattern unit 22 ends×9/12/9 picks	None detected	Yes	–	L11–12

FIG. 9
Table of 2/1 twills

thicknesses of yarn, every third weft thread being thicker and dyed with madder, demonstrating that two wefts were in use during weaving (Cat. No. 17). Some of the alternating yarn was dyed with woad and thus, originally, the cloth would probably have borne red stripes on a blue ground.

iii. Three-shed twills (Figs. 9 and 10; Pls. II, C and III, E)

A twill in which the warp ends regularly pass over two picks and under the following one is termed a 2/1 twill. Five such three-shed twills occur, none from deposits earlier than the late 10th century (Fig. 9). One is very coarse and used yarn spun straight from the fleece (Cat. No. 25). It was stitched to another piece of coarse cloth woven in a tabby binding (Cat. No. 7). Two of the others are unpatterned (Cat. Nos. 26 and 27: Fig. 10, A; Pl. II, C). The former was woven from natural brown wool. Both are slightly warp-faced and use combed Z-spun warp yarn and woollier S-spun weft yarn.

The remaining two three-shed twills are patterned and represent the best quality wool cloth in the assemblage (Nos. 28 and 29: Fig. 10, B and C; Pl. III, E). They were woven from very fine worsted yarn with a higher proportion of warp threads to weft threads. Unfortunately only a small part of each design can be reconstructed since they were both found in an advanced state of decay on a floor in the 11th-century building at Watling Court. Unlike the broken twills, each pattern unit is characterised by point repeat.

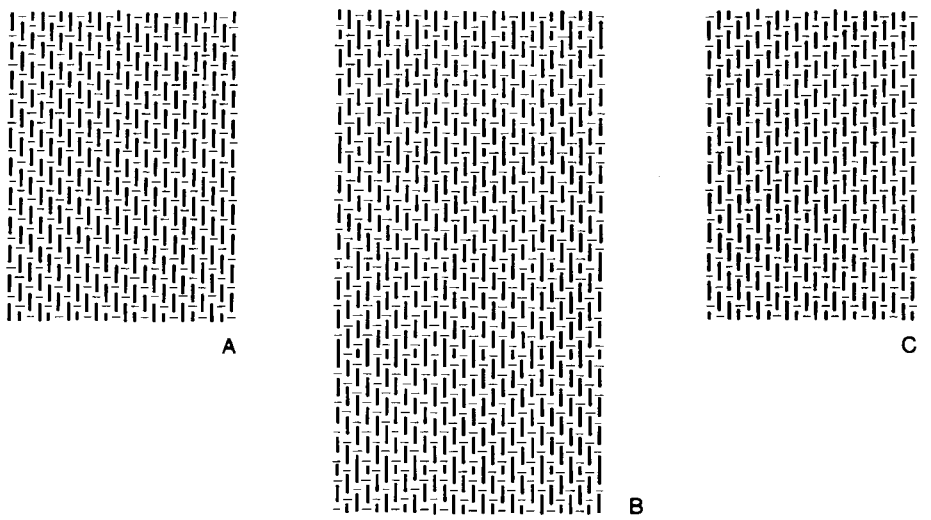

FIG. 10

Weave diagrams of 2/1 twills: A. Simple twill; B. Lozenge twill, Cat. No. 29 (partly reconstructed); C. Lozenge twill, Cat. No. 28 (partly reconstructed)

Fulling

None of the tabbies or twills described above appear to have been fulled although some uncombed weft yarn has become slightly matted with wear.

Dyeing

Twenty-seven of the textiles woven from wool were analysed for dyestuffs, including samples from each type of cloth. They gave eleven positive results. The dyestuffs identified are madder (*Rubia tinctorum* L.), which is present on six pieces of

cloth; indigotin which can be extracted from a number of different plants including woad (*Isatis tinctoria* L.), which was probably the source of the dyestuff used here; and a purple-producing lichen, the species of which has not been established.[20] Some of the other cloth may have been dyed with less colour-fast (fugitive) dyestuffs of which all trace has now vanished.

The results show that both coarse and better quality cloth were dyed and hence were decorative as well as functional. Since the finish of the coarse tabbies is uneven the wool was probably dyed in the fleece or the skein. Contrasting colour effects on two fragments also indicate the practice of dyeing wool before weaving (Cat. Nos. 4 and 17). It is uncertain at what stage during production the remaining twills were dyed, although the absence of finishing processes such as fulling, which results in a more compact surface to the cloth thereby enabling the dye to be more evenly absorbed, may indicate that the cloth was not dyed in the piece. Two twills were dyed in two different dyebaths to obtain hues of purple (Cat. Nos. 22 and 28). Thus an understanding of the behaviour of dyes and how they could be combined to widen the range of colours must have been current.

Sewing techniques (Fig. 11)

Sewing is evident on eight of the textiles woven from wool including two which have been stitched together (Figs. 4, 6 and 9). Two pieces have hemmed edges. On one an edge has been cut, folded inwards and sewn in overcast stitch from right to left at intervals of 4 mm (Cat. No. 29: Fig. 11, A; Pl. III, E). Such sewing could have secured a trimming, perhaps of a different fabric or even of fur.[21] The hem on the other piece was formed by folding the edge of the cloth double and then sewing it down but the type of stitch used is uncertain. (Cat. No. 26: Fig. 11, B; Pl. II, C). The

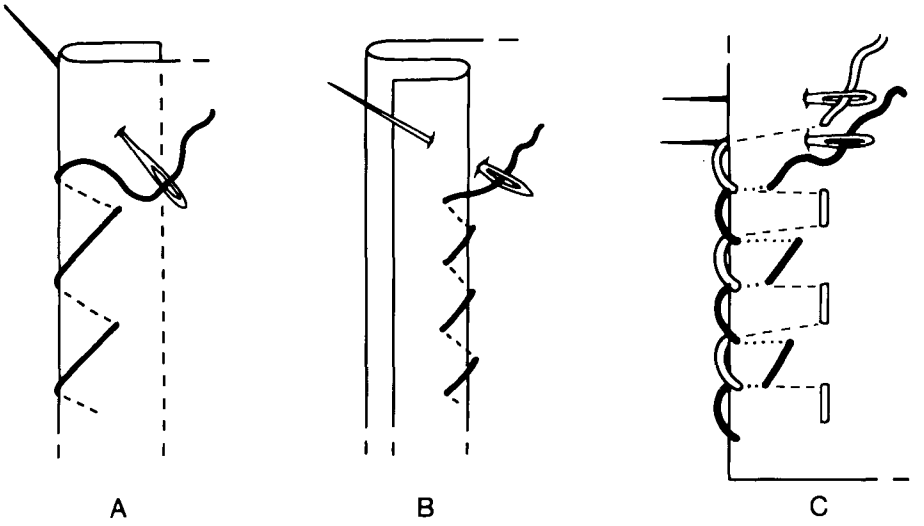

FIG. 11

Diagrams of hems and sewing stitches: A. Cat. No. 29; B. Cat. No. 26; C. Cat. No. 2

sewing thread was spun from natural white wool, possibly dyed, in contrast to the cloth which was woven from natural brown wool.

Three rows of stitching, apparently sewn with two threads of wool, are visible on one cloth (Cat. No. 2: Fig. 11, C; Pl. II, A). The looped stitches made along the edge would have enabled the cloth to have been sewn to a second piece of fabric without the need for a bulky seam. The other two rows of stitches, as well as being decorative, would have served to strengthen the loops which would otherwise quickly have become detached from the edge. Although an exact parallel is not known, the use of blanket stitches of various complexity for seams was widespread in northern Europe.[22]

The remainder of the sewing is vestigial and some may merely represent the homely economy of patching-up worn cloth.[23] Two-ply wool thread, Z-spun and S-twisted, has been consistently used for the sewing.

Cords (Fig. 12; Pl. II, D)

Four small lengths of plied cord, 4 mm and 8 mm in diameter, were recovered from one Group Two pit fill. Two consist of fourteen Z-spun elements and the other two of six Z-spun elements. All have been similarly S-plied (Cat. No. 30: Fig. 12; Pl. II, D). They probably represent tassels from a fringe, a characteristic feature of cloth and braids woven in classical and post-Roman antiquity.

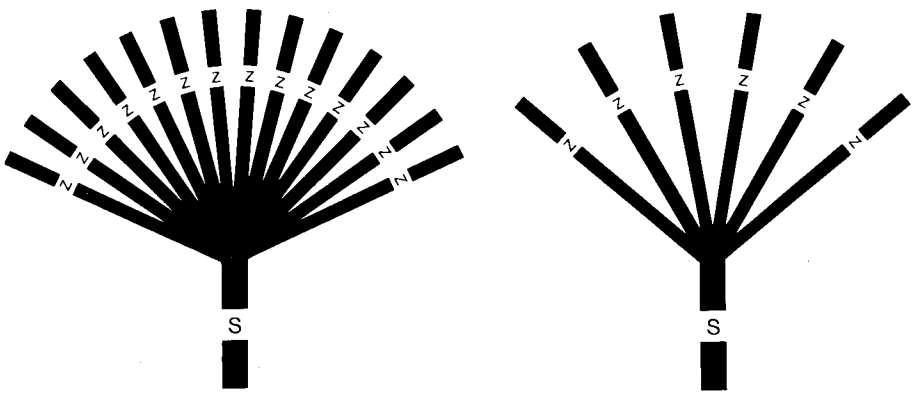

FIG. 12
Diagram showing the construction of the wool cords, Cat. No. 30

B. GOAT HAIR TEXTILES (Fig. 13; Pl. I, D)

Two of the Group Four pits at Milk Street yielded cloth woven from the coarse hair of goat (Fig. 13).[24] In one pit the fragments were all woven in a tabby binding from two-ply yarn, S-spun Z-plied, and include part of a simple selvedge (Cat. No. 31: Pl. I, D), while from the other pit the fragments were woven in 2/1 twill from single S-spun yarn (Cat. Nos. 32 and 33).

C. SILK TEXTILES

There are six silks, 14% of the textiles. Four are woven, three in a tabby binding and one in a compound twill. The remainder consist of two lengths of plied cord and

Cat. no.	Site	Context no.	Reg. no.	Dimensions (mm)	Spin dir.	Yarn diameter (mm)
31	MLK 76	1144	582	Largest 210×145	SZ/SZ	3–4/3–4
32	MLK 76	103	33	Largest 65×85	S/S	1.5–2/1.5–2
33	MLK 76	104	180	80×130	S/S	1.5/1.5

Cat. no.	Sett.	Selv-edge	S. Border	Weave	Sewing	Pit group	Date
31	2/2	Yes	–	Tabby	Yes	4	L11–12
32	5/4	–	–	2/1 twill	–	4	L11–12
33	4–5/4–5	–	–	2/1 twill	–	4	L11–12

FIG. 13
Table of cloth woven from goat hair

Cat. no.	Site	Context no.	Reg. no.	Dimensions (mm)	Dir. of twist	Angle of twist	Sett	Selv-edge	Dyestuff/s	Sewing	Pit group	Date
34	MLK 76	1041	485	12×225	Z/–	50°/–	30–34/20–24	–	Not analysed	Yes	2/3	L9–10
35	MLK 76	48	17	22×45	Z/–	45°/–	23/18–20	–	None detected	–	3	L10
36	MLK 76	1215	1086A	Largest 6×8	–/–	–/–	*c.* 53/*c.* 32	Yes	None detected	Yes	3	L10

FIG. 14
Table of silk tabbies

part of a braid. All were recovered from deposits which date from the late 9th to the late 10th century.

The type of silk used comes from the species *Bombyx mori*, the most common cultivated variety.[25] Silk filament is produced when the silkworm pupates, spinning itself into a cocoon. The raw silk is naturally coated in a gum, sericin, which holds together the two strands (brins) of silk formed in the cocoon. The gum may be removed at different stages during processing or alternatively not at all.[26]

Tabby weaves (Fig. 14: Pls. IV, B and V, C)

One of the three pieces of tabby silk was woven, at least in part, from silk left in its gummed state, resulting in dull and slightly rigid threads (Cat. No. 36: Pl. IV, B). It formed part of a narrow warp-faced ribbon with simple selvedges. In contrast, the other two were woven from degummed silk (Cat. Nos. 34 and 35). Twisted silk was used for the warp while the weft thread was simply unravelled. Some of the weft thread is of inferior quality and uneven thickness (Pl. V, C). The two tabbies sampled for dyestuffs produced negative results and may, therefore, have been self-coloured.[27]

A weft-faced compound twill (Fig. 15, A and B; Pl. V, A and B). Based on analyses by GILLIAN M. EASTWOOD and DONALD KING

A fragment of patterned silk, showing a small angular detail from a larger design, is an example of a weft-faced compound weave (Cat. No. 37). Both warp and weft consist of silk threads without apparent twist. The warp threads are undyed. Some of the weft threads are also undyed, while others have been dyed red; on the face of the textile the pattern appears in white on a red background. The weaving was probably carried out on a draw loom, the type of loom which was generally used for complex pattern-weaving throughout the Middle Ages and down to the 19th century.

In the compound weave seen in this example, every second warp thread was controlled by a binding harness, which allowed the weaver to open three different sheds or openings in these binding threads. He first raised all the threads marked 1 in the diagram and passed first a white and then a red weft thread through the shed thus formed. Closing this shed, he opened another by raising all the threads marked 2, and again passed a white and a red thread. He then repeated the first shed and so on consecutively, thus binding all the weft threads in a weft-faced twill. Simultaneously with these actions of the weaver, the other warp threads, marked F, were being controlled by a figure harness operated by the weaver's assistant. This harness raised preselected groups of figure warp threads while the weaver was passing a white weft thread. Then, having lowered these, the harness raised all the other figure warp threads as the weaver passed a red weft thread. In this way, wherever a white weft thread floated on the face of the textile, the following red thread floated on the back, and vice versa. The figure harness was programmed to open a series of different sheds in the figure warp so that, as the weaver passed more and more white and red weft threads, a repeating pattern, in white on red, was gradually built up on the face of the textile (Pl. V, A); the same pattern appears, in red on white, on the back, but is there somewhat obscured by the greater prominence of the binding warp threads (Pl. V, B). Unlike the binding warp threads, the figure warp threads are not apparent on the face or the back of the textile, since they are almost completely concealed by the weft threads.[28]

Other tiny fragments of the cloth were patterned with blue weft threads as well as red and white ones. The sources of the red and the blue dyes have been identified as madder and a plant producing indigotin.

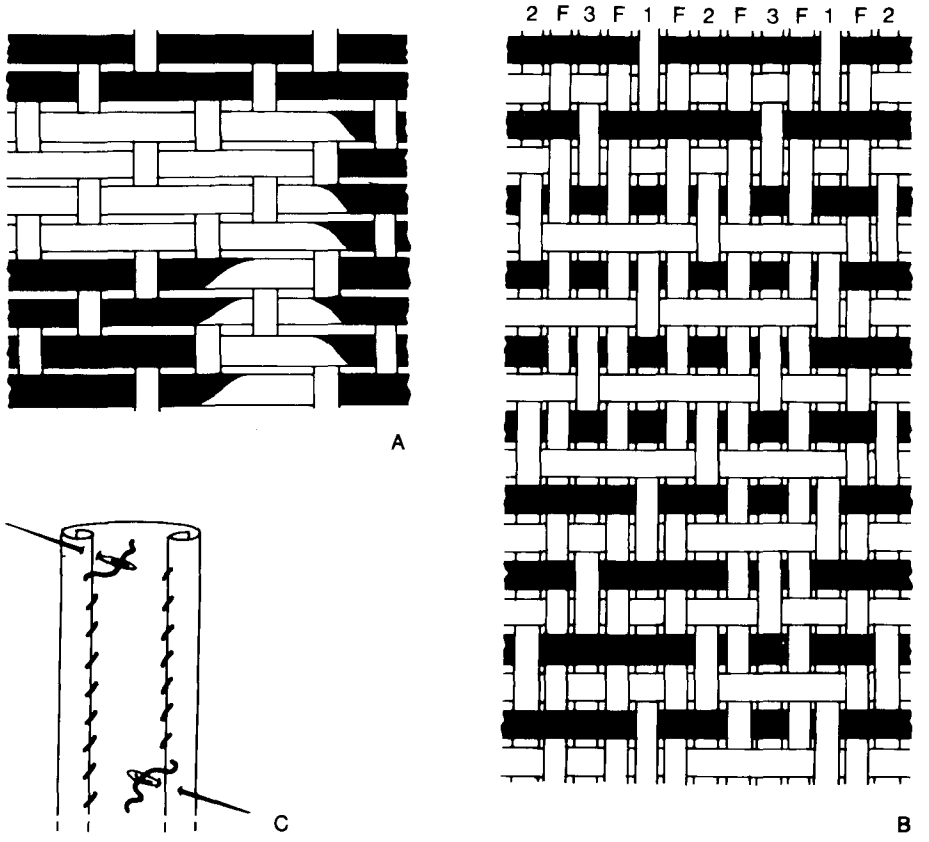

FIG. 15

A. Diagram of detail of patterned silk, Cat. No. 37, showing threads visible on face of textile; B. Expanded diagram of same detail showing all threads in the weave; C. Diagram of sewing, Cat. No. 34

The sewing (Fig. 15, C)

Traces of sewing are evident on three of the silks. One piece of tabby woven cloth has been cut twice along the grain of the fabric to form a narrow strip more than 225 mm in length (Cat. No. 34). Both cut edges have been folded double and neatly hemmed on either side with slip stitches sewn in opposite directions at intervals of 3 mm (Fig. 15, C: Pl. v, c).[29] This gives a finished width of 11 mm, tapering at one end to 6 mm. The tapered end is also cut and small creases suggest that the tape may formerly have been attached to another piece of cloth, perhaps for use as a tie at the neck opening of a garment or to secure a headdress.[30]

The fragments of patterned silk and the warp-faced tabby ribbon also bear traces of sewing (Cat. Nos. 36 and 37). Shortly after recovery it was noted that the ribbon, then 75 mm in length, was stitched to the finer cloth by means of slip stitches sewn at intervals of approximately 1 mm.[31] Unfortunately very little of the stitching now survives, but a few tiny pieces of two-ply silk sewing thread can be observed (Pl. IV, B).

Cord and braid (Pls. IV, C and V, D)

Two pieces of cord, 2 mm in diameter and 410 mm and 105 mm in length, are tied together in a reef knot (Cat. No. 38: Pl. V, D). The longer was Z-plied from eight S-twisted threads while the shorter was Z-plied from seven S-twisted threads. The silk was dyed yellow, probably with weld (*Reseda luteola* L.) but it is fluffy, as if of a low grade; the possibility of it being floss (silk waste) cannot be excluded.[32] Extending along the length of the cords are several small knots joining together individual threads while a knot has been tied at the end of the shorter cord to prevent it from unravelling.

A long strand of unspun silk is also preserved, coiled into a bobble (Cat. No. 39: Pl. IV, C). Evenly spaced spirals along its length suggest that the thread may have come from a tablet-woven braid of which the other elements have disintegrated, perhaps because they were made from a different fibre such as flax.

D. VEGETABLE FIBRE TEXTILES (Fig. 16)

Acidic soil conditions mean that cloth woven from vegetable fibres, such as flax, has rarely been preserved. The two examples recovered, from pits in Groups Three and Four (Cat. Nos. 40 and 41), have been tentatively identified as cultivated flax (*Linum usitatissimum*), but they have lost virtually all their special properties since the fibres have become brittle due to replacement by metal corrosion-products. The fragments show that the cloth was woven in a balanced tabby binding, the type of weave most closely associated with the fibre, and that the yarn has been Z-spun (Fig. 16). Such a spin direction is opposed to the natural rotation of the fibre but is a common characteristic of linen produced in northern Europe.[33] Folds have been preserved in the cloth but they are probably the accidental result of burial in the ground and cannot be attributed to the use of pleats.[34]

III. EVIDENCE OF TEXTILE MANUFACTURE

Spinning

Nine bone and three stone spindlewhorls found in the City indicate domestic production of yarn. The bone whorls have been made, as usual, from the hemispherical fused femur heads of cattle and range in weight from 12gm to 27gm, while the stone is a locally obtained calcite mudstone, cut and shaped into conical whorls weighing between 15gm and 23gm (Fig. 18, Nos. 14–16).[35] The weight of the whorl effects both the thickness of the thread and the amount of twist the thread is given but all three types of yarn described above could have been spun with the assistance of whorls similar to the examples excavated.

Weaving

Evidence of local cloth weaving is restricted to the occurrence of loomweights and pin-beaters, both linked (but the latter not exclusively) to the use of the warp-weighted loom and common on rural and urban sites in England throughout the

Cat. no.	Site	Context no.	Reg. no.	Dimensions (mm)	Spin dir.	Angle of twist
40	MLK 76	29	31	Largest 50×33	Z/Z	35°/25°
41	MLK 76	262	66	Largest 21×66	Z/Z	30°/25°

Cat. no.	Yarn diameter (mm)	Sett	Selv-edge	Dyestuff/s	Sewing	Pit group	Date
40	0.3/0.6	14/14	–	Not analysed	–	3	L10
41	0.5/0.5	19/16–17	–	Not analysed	–	4	L11–12

FIG. 16
Table of vegetable fibre tabbies

Saxon period.[36] There is no other information about different types of loom used in London until the 12th century when references to local weavers and to a London gild start to appear in documents: the craft was by then male-dominated.[37]

i. Loomweights (Figs. 1 and 17)

Twenty examples of bun-shaped loomweights have been recorded from findspots within the City (Fig. 1).[38] Most of these were found in groups of between two and four from sites in the eastern half and may represent the remains of burnt looms since they are partly charred. All were made from a local clay dug from the brickearth and contain quartz grains, chaff, roots, minute inclusions of iron and occasional, large fragments of flint.[39] Large clay pellets are also present in several examples, showing that the loomweights were made without thorough mixing of the clay. Two have incised 'brand' marks and another a ring of finger tipping similar to examples recorded in other parts of England and in N. Germany (Fig. 17, Nos. 2, 3, and 7).[40]

The loomweights found in groups bear a close resemblance to one another in size and weight, showing that they would have been made in sets carefully balanced to provide an equal tension when tied to the warp. Thus, a group of three loomweights found at the corner of King William Street and Sherbourne Lane all weigh between 1044 gm and 1155 gm,

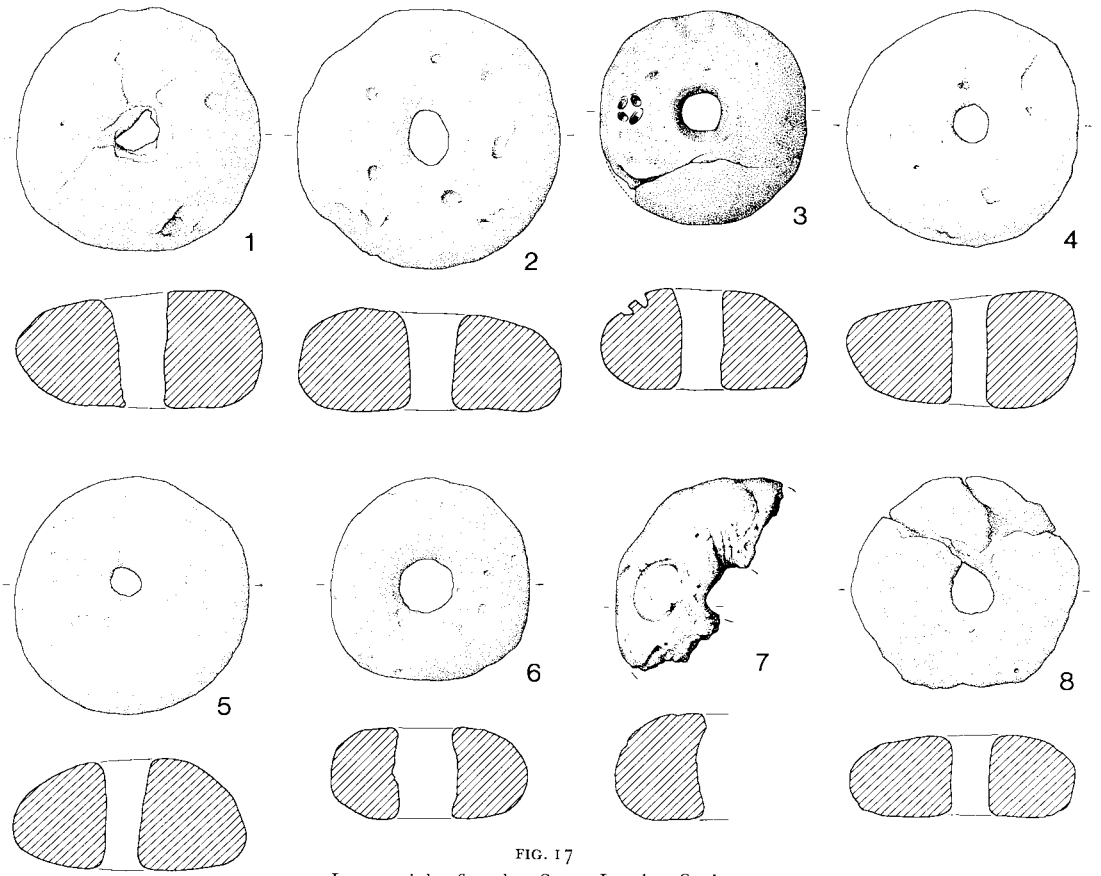

FIG. 17
Loomweights from late Saxon London. Scale 1:4

possess a diameter range of between 125 mm and 129 mm and range in thickness from 64 mm to 69 mm (Fig. 1, No. 8; Fig. 17, No. 1). In contrast a single loomweight recovered from Paternoster Row is much smaller and weighs only 590 gm (Fig. 1, No. 1; Fig. 17, No. 8). The overall variation in weight is considerable but three different categories can be distinguished, heavy (weights in excess of 800 gm); medium (400 gm to 800 gm) and light (less than 400 gm).[41] Ten London examples fall into the heavy category and range between 918 gm and 1206 gm. Of the remaining ten, four are medium weight, 540 gm, 566 gm, 590 gm and 595 gm; one is light, 315 gm, and the other five are merely fragments. A similar weight division can be noticed in groups of loomweights from other English towns. For example at Back Street, St Cross, Winchester, all the loomweights from a collapsed loom weighed less than 400 gm, while most of those from a pit in Chapel Street, Chichester, weighed more than 800 gm.[42] The heavier weights probably affected the type of cloth being woven and in particular the spacing of the warp ends.

There is little dating evidence for the loomweights from London. One was found reused in the foundations of a 12th-century building (Fig. 1, No. 16) but many could have fallen out of use many years earlier as other types of looms were adopted. The date of the introduction of the horizontal treadle-loom is a matter of conjecture, but the evidence points to *c.* A.D. 1000.[43]

ii. Pin-beaters (Figs. 1 and 18)

Pin-beaters (or thread-pickers) were used to beat in the weft on a loom.[44] Six have been recorded from London in similar localities to most of the loomweights' (Fig. 1; Fig. 18, Nos. 9–12). They range from between 85 mm and *c.* 130 mm in length and 7 mm to 8 mm in diameter and are made from either bone or antler, which has become highly polished with handling. Their dating poses the same problems as that of the loomweights but extrinsic evidence indicates that they were rare after the 10th century.

Dyeing

The different dyeing processes leave little physical trace apart from an occasional accumulation of rotting vegetable waste. Seeds from a number of plants, such as weld (*Reseda luteola* L.) and yellow flag (*Iris pseudacorus* L.), from which dyes could be extracted, have been identified from late 9th- to 11th-century deposits in London but it is not known how the plants were actually used.[45] Woad and madder, the chief commercially used dyestuffs, were cultivated in rural districts, Berkshire and Hampshire for example, but demand led to the importation of additional supplies from northern Europe and dealers in the two commodities are recorded as operating in English towns in the late 11th and 12th centuries.[46] References to the use of lichen dyes are absent from early medieval literature but they were a traditional source of colour and would have been gathered growing wild on rocks or in woods, a custom which continues today in the production of tweed in remote areas of Britain.[47]

Linen

Little is known of the early history of linen manufacture in London and archaeological evidence for the industry is equivocal. Flax seeds have been recorded among the plant remains from Milk Street but they are probably associated with the extraction of linseed oil rather than with the processing of flax fibres.[48] The use of the warp-weighted loom need not have been restricted to the production of wool cloth. Indeed, it has been argued that when looms were erected in sunken-floored buildings, the damp atmosphere would have been suited to the weaving of linen,[49]

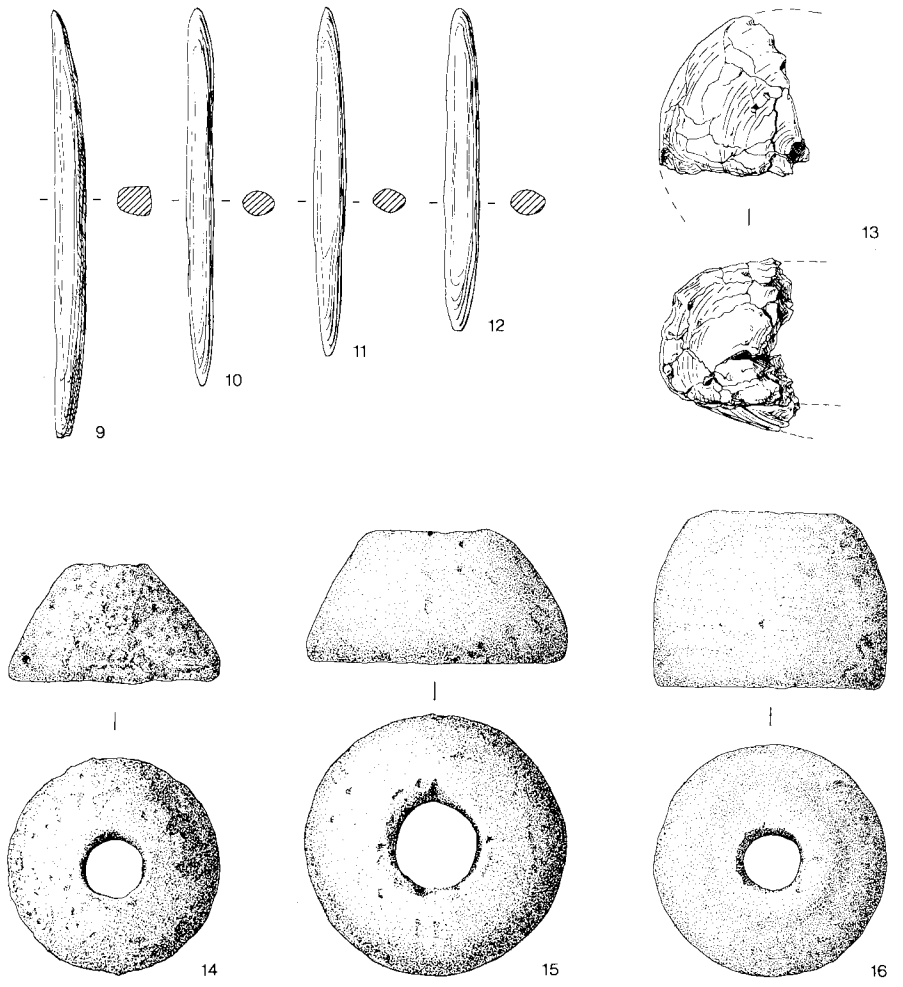

FIG. 18

Cloth-working tools from late Saxon London. Pin-beaters, Nos. 9–12; Scale 1:2. Linen-smoother, No. 13; Scale 1:2. Stone spindlewhorls, Nos. 14–16; Scale 1:1

but firm proof is lacking for London. Glass linen-smoothers, used to impart a glazed surface sheen to the finished cloth, are also sometimes considered to be evidence of the manufacture of linen but they could equally well have been used for laundering. Only one has been excavated in London, from a late 9th-century deposit, and its state of preservation is poor due to the advanced weathering of the glass (Fig. 1; Fig. 18, No. 13). The chances of other examples surviving from London, which might throw further light on the subject, are therefore low.

IV. DISCUSSION

Despite the limited number of fragments, especially from the early 11th century, an important difference is apparent between the better quality London

cloth of the late 9th and 10th centuries and that of the late 11th century, since four-shed broken twills disappear from among them after the end of the 10th century and are replaced by patterned three-shed twills. This development seems to reflect a change in technology rather than just a change in taste and is evident throughout NW. Europe, marking a break in a weaving tradition that had lasted more than a millennium. For the coarse cloth, by contrast, no firm trends can be distinguished.

Four-shed broken twills with Z-spun warp yarn and S-spun weft yarn occur in Britain from before the Roman invasion to the 11th century.[50] More recent examples are exceptional, although one piece was excavated from a late 12th-century deposit at Perth, and it seems that production continued in remote areas of northern Europe away from the more organised manufacturing centres.[51] The close association between four-shed broken twills and the warp-weighted loom has been convincingly argued by Dr M. Hoffmann and it is no doubt significant that the decline in circulation of four-shed broken twills in London corresponds with the disappearance of loomweights from the archaeological record. The suggestion, therefore, that the warp-weighted loom was employed to produce burel, a low-quality cloth, in London until the 13th century does not seem to be supported by local archaeological discoveries, and a vertical loom tensioned by some other means was probably used.[52]

A recent comprehensive survey of the pattern repeat on many broken lozenge twills shows that the preference for a pattern unit of ten Z-spun threads by nine S-spun threads, seen on two examples from London, was internationally popular.[53] The frequency of the pattern is partly attributable to technical practices and in particular the tie-up of the warp-weighted loom.[54] The widespread popularity of the design over many centuries may thus have been the result of a diffusion of similar weaving techniques rather than of trade in the cloth.[55] The uniform quality of the product throughout the North Sea coastlands is, nevertheless, striking and has caused the cloth to be equated, if only tentatively, with the controversial *pallium fresonicum*.[56] Lozenge pattern units of variable size were also common in Britain from the 1st to the 11th century but the small size of most textile fragments makes it difficult to determine the overall design of the cloth.[57]

All examples of four-shed broken lozenge twills from London were woven from white wool and at least two examples were dyed, one with madder and one with woad. This is not unexpected since grave finds show that similar patterned cloth was used for clothing. There is even evidence to suggest that in Britain the cloth was more fashionable for men's wear.[58]

There is likewise a considerable degree of uniformity in the design and quality of four-shed broken chevron twills found in England and on the Continent. In London the pattern chiefly repeats after six or ten warp ends and a similar preference can be perceived in roughly contemporary assemblages from York (9th to 11th century), Dublin (mid 10th to 11th century) and Elisenhof, a small Frisian settlement situated at the mouth of the R. Eider (8th century).[59] Another characteristic of a number of the broken chevron twills is their narrow width and the finished width of 86 mm preserved on one example from London is paralleled by several from Elisenhof, all of which measure between 75 mm and 97 mm.[60] The Bronze Age Armoy belt from Co.

Antrim in Ireland, woven from horse hair, might be considered another parallel since it has a similar cloth design with reverses every ten threads and a finished width of 46 mm, but the sett of its warp is much higher.[61] The implication is that these narrow bands would have been woven on a small loom, although a method of warping was probably employed similar to that used for the broader widths of cloth.[62] The absence of reinforced selvedges, which have been recorded on wider widths of herringbone twill, is also significant since the need for side strengthening is diminished where the web is only narrow.[63] This cloth, at least, must have been of a different character from that regulated by the Assize of Measures, 1196, where a width of two ells was prescribed.

This type of four-shed broken chevron twill generally seems to have been dyed. On the examples from London, woad and a lichen dyestuff were used, indicating that the bands were likely to have been hues of blue or purple.[64] A similar preference is also apparent on broken chevron twills from Coppergate, York.[65] Such cloth would have been suitable for leg garters, which were worn in many regions of northern Europe in the 10th and 11th centuries as contemporary works of art portray (Pl. IV, A). Evidence from textiles of an earlier date indicates that cords were sometimes put to this use but most illuminated manuscripts depict flat woven bands.[66]

The striped four-shed twill also reflects the national taste for colourful patterned twills in the late 9th and 10th centuries.[67] In London, by contrast, brown wool was reserved for a four-shed broken twill of simpler design. Plain four-shed broken twills were similarly less common on the Continent than the ubiquitous patterned twills.[68]

The simple three-shed twill woven in brown wool resembles both the brown four-shed broken twill and the four-shed lozenge twill, dyed in madder, in texture and quality. This is because a similar combination of combed and woollen yarn was used. Unlike the broken twills, three-shed weaves continued to be manufactured throughout succeeding centuries when they were particularly associated with low-quality, domestic output in London and northern Europe.[69] The continuity of production clearly shows that three-shed constructions were never closely associated with the warp-weighted loom.[70]

Three-shed geometrically patterned worsteds, on the other hand, represent high-quality cloth produced by professional weavers.[71] In London, in addition to the two examples from Watling Court, fragments were recovered from a 12th-century waterfront dump.[72] Other examples have been recorded in England from Canterbury (late 11th and 13th centuries) and York (*c.* 11th and 12th centuries).[73] On the Continent, the cloth is first evident in 10th-century graves at Birka, while out of 23 stratified pieces from Oslo, 78% were recovered from 13th-century deposits.[74] Although Z-spun yarn for both warp and weft is usual, examples from Petergate, York, and from Lund have Z-spun yarn in the warp and S-spun yarn in the weft, comparable to one fragment from London.[75]

Three-shed lozenge twills obviously had a high prestige value since, at Birka, one woman was buried in a long, fur-trimmed jacket made from the cloth, which was silk-lined.[76] Similarly, in the 13th century, fine cloth with a three-shed lozenge

design formed part of the burial vestments of two abbots, Roger II of St Augustine's, Canterbury (died 1272), and Victor of Saint-Martin-de-Boscherville in Normandy (died *c.* 1208–1211).[77] Dyeing must have added further to the cost of the cloth and, as shown by one London example, the desired hue sometimes required immersion in more than one dyebath.

The production of three-shed lozenge twills coincides with records of the enigmatic cloth, haberget, referred to in French and English documents of the 12th and 13th centuries.[78] This contrasts with the initial suggestion proposed by Professor E. Carus-Wilson of four-shed broken lozenge twills, which archaeological evidence now reveals were unlikely to have been marketed commercially after the 11th century.

The association of three-shed patterned weaves with the horizontal treadle-loom cannot be demonstrated conclusively although there are no technical reasons why it should not have occurred. It is notable that the earliest depiction of a horizontal treadle-loom in an English manuscript shows a man weaving a length of cloth with a point repeat lozenge design but the loom appears to be a two-treadle countermarch type with one treadle going up as the other is depressed so that an even number of shafts would have been employed.[79] The introduction of the horizontal treadle-looom into western Europe is veiled in uncertainty but the impetus is likely to have come from the East. Patterned weaves of similar construction and design, made in lightweight fabrics such as fustian, also start to appear in Egypt in the 11th and 12th centuries, perhaps reflecting another aspect of the same phenomenon.[80]

Among the wool textiles from London, therefore, only three-shed patterned twills can be regarded with near certainty as imports. Even so, they could have been English and may possibly have been manufactured at Stamford, which specialized in the production of haberget.[81]

The foreign origin of the raw silk is unquestionable but the silk used for the cord and braid could have been imported as thread since it was in great demand for native embroidery.[82] The fragments of tabby, taffeta-like silk from London with Z-twisted warps and untwisted wefts are very close in weight and quality to the silks used for headdresses at Lincoln, York and Dublin.[83] Consequently, their wear need not have been confined to districts where Scandinavian influence was more marked. Small, plain piece goods of this nature were probably woven in gild or privately-owned workshops based in Byzantium or the Levant where the weaving of low-quality products was permitted.[84] Such silks could have been purchased at the twice-yearly fairs held at Pavia, which was regularly visited by Anglo-Saxon merchants and pilgrims from the end of the 8th century.[85]

Documents show that patterned silks were also acquired at Pavia, including two chasubles bequeathed in the will of Theodred, Bishop of London, *c.* 942 to 951.[86] In addition, the St Paul's inventory of 1245 lists ornate silk vestments worn by London prelates in the 11th century.[87] Thus, the tiny fragments of a patterned silk from Milk Street belong to a type of cloth held in high esteem by Anglo-Saxons. It would be foolhardy to propose a precise attribution for these scraps, but the textile was certainly imported to London over a distance of many hundreds — if not

thousands — of miles. The draw loom, probably the most complex machine known to the Middle Ages, was used to produce patterned silks in the weft-faced compound weave at numerous weaving centres in a vast tract of territory extending from China in the East to Spain in the West. Weft-faced compound silks occur widely throughout northern Europe in the 10th century but most excavated fragments of this date employ paired, Z-twisted main warps in contrast to the London example. The latter, with its single untwisted warp threads, was a lighter, thinner and more flexible fabric. Such untwisted warp threads are found in several types of patterned silks woven in various parts of Asia and it is quite possible, though by no means certain, that the Milk Street patterned silk was of Asian origin.[88]

The linen and coarse goat-hair cloth are both recognisable types found throughout N. Europe during many centuries and merit no further comment here.

The London textiles offer an exciting new body of evidence concerning different types of cloth used from the late 9th to the early 12th century and give an indication of local and national taste. More significantly, they present a microcosm of changes in textile manuacture which occurred throughout northern Europe and show just how homogeneous was contemporary textile trade and industry in the North Sea basin.

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APPENDIX

Fleece type	Cat. no.	Weave	System	Spin dir.	Fibre diameter range (μm)	Mode/most frequent class (μm)	Mean (μm)	Standard deviation	Degree of skew*	Distribution	% Medullated	% Pigmented
H	8	Tabby	Weft	S	12–130	20	27.9	±18.7	+0.78	P	9	1
H	4	Tabby	Warp?	Z	14–132	20	25.0	±14.6	+1.07	P	5	1
H	1	Tabby	Warp?	Z	14–100	24	29.7	±11.2	+1.06	P	7	–
HM	8	Tabby	Warp	Z	12–84	20	26.2	±12.1	+0.74	P	8	4
HM	1	Tabby	Weft?	S	18–56	32	29.7	±7.5	+0.80	P	1	–
HM	2	Tabby	Warp?	Z	14–92	24	28.8	±13.1	+0.80	P	6	–
HM	4	Tabby	Weft?	Z	12–72	20	25.6	±10.9	+0.69	P	3	1
HM	13	2/2 lozenge twill	Warp?	Z	16–68	28	29.4	±8.1	+0.66	P	1	1
HM	13	2/2 lozenge twill	Weft?	S	16–60	24	28.8	±8.0	+0.55	P	–	–
HM	11	2/2 lozenge twill	Warp?	Z	16–60	24	28.4	±9.2	+0.96	P	2	–
HM	11	2/2 lozenge twill	Weft?	S	12–64	28	32.0	±11.3	+1.10	P	5	–
HM	12	2/2 lozenge twill	Warp?	Z	16–60	24	26.7	±9.1	+0.49	P	3	–
HM	12	2/2 lozenge twill	Weft?	S	16–88	24	37.6	±13.6	+0.55	C/SS	18	1
HM	15	2/2 lozenge twill	Warp?	Z	12–96	20	22.9	±11.3	+0.88	P	3	25
HM	16	2/2 lozenge twill	Weft?	S	12–88	24	26.8	±11.8	+0.81	P	2	–
HM	24	2/2 twill	Warp?	Z	14–96	20	31.3	±12.9	+0.86	P	7	89
HM	24	2/2 twill	Weft?	S	16–68	20	28.5	±10.7	+1.32	P	3	86
HM	19	2/2 chevron twill	Warp	Z	16–76	24	30.2	±12.3	+0.76	P	6	–
HM	19	2/2 chevron twill	Weft	S	16–64	20	29.4	±10.4	+1.56	P	9	–
HM	20	2/2 chevron twill	Warp	Z	16–68	28	31.0	±11.3	+0.67	P	10	1
HM	20	2/2 chevron twill	Weft	S	16–80	24/28/32/40	37.0	±11.9	+0.32	P	17	2
HM	21	2/2 chevron twill	Warp	Z	18–72	24/28	33.4	±11.1	+1.32	C/P	4	–
HM	21	2/2 chevron twill	Weft	S	16–72	28	33.0	±9.8	+0.55	P	3	–
HM	22	2/2 chevron twill	Warp	Z	16–64	28	33.8	±9.6	+0.63	P	5	–
HM	26	2/1 twill	Warp?	Z	16–88	28	34.8	±12.6	+0.73	P	4	75

HM	26	2/1 twill	Weft?	S	12–68	28	29.5	±10.7	+0.55	P	1	85
HM	27	2/1 twill	Warp?	Z	16–76	24	33.0	±13.0	+0.43	P	4	–
HM	27	2/1 twill	Weft?	S	12–76	20	27.9	±10.2	+1.16	P	1	7
HM	25	2/1 twill	Warp?	S	20–72	24	32.8	±11.2	+0.95	P	12	–
HM	25	2/1 twill	Weft?	S	12–58	16	23.8	±11.2	+0.90	P	–	3
HM	7	Tabby	Weft	S	14–60	20	24.0	±10.1	+1.28	P	12	10
HM	3	Sewing thread	—	Z	16–68	28	32.0	±12.2	+1.02	P	5	18
HM	30	Tassel	—	Z	12–72	32	31.0	±11.6	+0.39	SY	1	2
GM	5	Tabby	Warp	Z	12–48	16	21.7	±7.2	+0.93	P	3	2
GM	5	Tabby	Weft	Z	12–44	16	20.0	±6.8	+1.08	P	2	–
GM	2	Tabby	Weft?	S	14–52	16/20	26.5	±10.0	+0.95	P	1	–
GM	15	2/2 lozenge twill	Weft?	S	12–48	16	24.4	±8.0	+0.48	P	3	20
GM	16	2/2 lozenge twill	Warp?	Z	12–54	20	26.7	±8.7	+0.99	P	7	3
GM	10	2/2 lozenge twill	Warp?	Z	12–54	20	27.4	±9.3	+0.63	P	4	2
GM	10	2/2 lozenge twill	Weft?	S	12–52	20	25.5	±9.1	+0.74	P	–	5
FGM	6	Tabby	Warp?	Z	12–40	16	20.7	±6.2	+0.66	P	–	–
FGM	6	Tabby	Weft?	Z	12–40	16	22.6	±6.2	+1.32	P	–	–
TM	3	Tabby	Warp?	Z	12–60	(20)	28.3	±9.1	+0.37	SY	–	2
TM	3	Tabby	Weft?	S	16–52	32	28.3	±7.2	+0.29	SY	1	11
TM	18	2/2 chevron twill	Warp?	Z	12–64	(20)	32.0	±10.7	+0.21	SY	1	2
TM	18	2/2 chevron twill	Weft?	S	16–56	(20)	32.0	±9.2	+0.22	SY	4	2
TM	22	2/2 chevron twill	Weft	S	16–60	32	36.5	±11.6	+0.31	C/SY	9	–
TM	10	Sewing thread	—	Z	16–56	28	32.2	±8.4	+0.32	SY	5	1
S	7	Tabby	Warp	Z	14–44	28	26.0	±7.2	+0.20	SY	7	8

H	Hairy	P	Positively skewed
HM	Hairy medium	C	Continuous
GM	Generalized medium	SY	Symmetrical
FGM	Fine generalized medium	SS	Slightly skewed
TM	True medium	( )	Low value possibly due to sampling error
S	Shortwool	*	Skew = Pearson coefficient of skewness = $\frac{3\,(\text{mean} - \text{median})}{\text{standard deviation}}$

NOTES

[1] Published English assemblages include E. Crowfoot, 'Textiles', 36–39 in M. O. H. Carver, 'Three Saxo-Norman tenements in Durham City', *Medieval Archaeol.*, 23 (1979), 1–80; J. W. Hedges, 'The textiles and textile equipment', 190–93 in C. M. Heighway, A. P. Garrod and A. G. Vince, 'Excavations at 1 Westage Street, Gloucester, 1975', *Medieval Archaeol.*, 23 (1979), 159–213; and A. MacGregor, 'Anglo-Scandinavian finds from Lloyds Bank, Pavement, and other sites', 100–36 in P. V. Addyman (ed.), *The Archaeology of York 17/3* (York, 1982).

[2] Thanks are due to my colleagues Brian Spencer, John Clark and Peter Stott of the Medieval Department, Museum of London, for giving me access to this material. Information concerning textile artefacts from the City of London in the Cuming collection was kindly supplied by Chris Green, Cuming Museum.

[3] T. Dyson and J. Schofield, 'Excavations in the City of London: second interim report, 1974–1978', *Trans. London Middlesex Archaeol. Soc.*, 32 (1981), 24–81.

[4] A. G. Vince and B. Hurman, 'The Saxon pottery from Milk Street 1976', Level III Archive report (1982), held at Museum of London.

[5] A penny of Cnut struck in London under the moneyer Aelfwig, *c.* 1017 to 1023, was recovered from a pit in Group Four, but most of the pits in Group Four are almost certainly post-Conquest.

[6] S. Roskams and J. Schofield, 'The Milk Street excavation: part 2', *London Archaeol.*, 3 (1978), 227–34.

[7] D. Perring, 'Excavations at Watling Court part 2: late Roman to modern', *London Archaeol.*, 4 (1982), 208–13.

[8] Procedures for fibre identification are set out in H. M. Appleyard, *Guide to the Identification of Fibres*, 2nd ed. (Leeds, 1978).

[9] A. Fraser, *Sheep Production* (London, 1947), 133–45; J. Hammond Jr., I. L. Mason and T. R. Robinson, *Hammond's Farm Animals*, 4th ed. (London, 1971), 135–36.

[10] M. L. Ryder, 'Changes in the fleece of sheep following domestication', 495–521 in P. J. Ucko and G. W. Dimbleby (eds.), *The Domestication and Exploitation of Plants and Animals* (London, 1969). Ryder's work is now collated in M. L. Ryder, *Sheep and Man* (London, 1983).

[11] M. L. Ryder, 'Animal fibres and fleece types', 127–28 in MacGregor, op. cit. in note 1.

[12] P. L. Armitage, 'The early history of English longwool sheep', *The Ark*, 10, No. 3 (1983), 90–97. The significance of the fleece types represented by the Milk Street textiles in tracing the early history of British sheep will be discussed further in P. L. Armitage, 'Medieval sheep', *The Biologist* (forthcoming).

[13] Lambs' wool is known to have been used for garments on occasion since St Wulfstan (*c.* 1012–95) is described as wearing it rather than sable, beaver or fox fur: R. R. Darlington (ed.), *The Vita Wulfstani of William of Malmesbury* (London, 1928), 46.

[14] M. Hoffmann, *The Warp-weighted Loom* (Oslo, 1964), 287. The term *timplean* in *Be Gesceadwisan Gerefan*, 455 in F. Liebermann (ed.), *Die Gesetze der Angelsachsen*, I (Leipzig, 1903) is often translated as a carding tool but its true identity is unknown.

[15] Full definitions of the terms used are to be found in D. K. Burnham, *A Textile Terminology* (London, 1981).

[16] The dyestuffs on the textiles woven from wool were identified by Miss Penelope Walton. The dyestuffs were extracted with solvents and the absorption spectra measured; results were checked by means of paper chromatography.

[17] Wherever selvedges or borders are preserved in similar Anglo-Saxon twills, the Z-spun yarn is shown to be the warp.

[18] For a fuller explanation of the occurrence of gores in early textiles see A. S. Henshall, 'Early textiles found in Scotland, Part 1', *Proc. Soc. Antiq. Scot.*, 86 (1951–52), 1–29.

[19] The pattern of the cloth is very confused at the point where the fault occurs and cannot be fully disentangled. However, the heddles appear to have been reknitted with one warp thread less than in the initial tie-up. For a discussion of weaving faults on other 2/2 broken twills resulting in point repeat see Hoffmann, op. cit. in note 14, 189–93.

[20] The identification of the lichen is tentative. Although weak positive results were obtained by Miss Penelope Walton, further tests to determine the nature of the lichen by means of thin layer chromatography, undertaken by Dr D. G. Duff, Paisley College of Technology, failed to establish its presence.

[21] An example of similar stitching, fastening a border of fur to the edge of a fine 2/1 lozenge twill, was found in Grave 838 at Birka, I. Hägg, 'Viking women's dress at Birka: a reconstruction by archaeological methods', 316–50 in N. B. Harte and K. G. Ponting (eds.), *Cloth and Clothing in Medieval Europe* (London, 1983).

[22] Published examples include M. Hald, *Ancient Danish Textiles from Bogs and Burials* (Copenhagen, 1980), 284; and R. Ullemeyer and K. Tidow, 'Textil- und Lederfunde der Grabung Feddersen Wierde', 76–152 in W. Haarnagel, *Feddersen Wierde*, Vol. 3 (Frankfurt am Main, 1981).

[23] Many examples of patched clothing are illustrated in K. Schlabow, *Textilfunde der Eisenzeit in Norddeutschland* (Neumunster, 1976).

[24] Details of the cuticular scales and cross-sections of the fibres were obtained by means of a scanning electron microscope. Archive report by Dr P. L. Armitage, British Museum (Natural History), held at Museum of London.

[25] The species and the gummed and degummed state of the silk were identified by R. Cook and M. Patterson, Metropolitan Police Forensic Laboratory.

[26] A. Geijer, *A History of Textile Art* (London, 1979), 4.

[27] The dyes on the silks were analysed by Dr J. Harvey.

[28] The fragments of weft-faced compound twill are too small for accurate measurement of the sett of the threads.

[29] Both hems could have been sewn in the same direction if the cloth was not turned 90°.

[30] The use of ties as neck fastenings to tunics are shown, for example, in the illumination of Goliath: London, British

Library MS. Cotton Tiberius C.VI, f.9 reproduced in E. Temple, *Anglo-Saxon Manuscripts* (London, 1976), illustration no. 308; while a 10th-century silk cap from Coppergate, York has traces of two linen ties: P. Walton, 'A silk cap from Coppergate', *Int. Bull. York Archaeol. Trust*, 7, No. 2 (1980), 3–7. Cloaks are also occasionally depicted as being fastened with ties in the 11th century but they are elaborately decorated and look more like embroidered braids than plain ribbons, e.g. Cnut and his queen presenting an altar cross to Christ: London, British Library MS. Stowe 944, f.6 reproduced in Temple, op. cit., illustration no. 244.

[31] Note on site accession card written before conservation treatment.

[32] A yellow dye belonging to the flavone group was identified. Other possible plant sources include birch, broom and camomile but weld was the most common commercially produced yellow dyestuff available in Europe in the Anglo-Saxon period.

[33] J. P. Wild, *Textile Manufacture in the Northern Roman Provinces* (Cambridge, 1970), 38.

[34] The remains of pleated linen inside oval brooches recovered from graves at Birka has enabled the style of women's shirts to be reconstructed: Hägg, op. cit. in note 21. Such an exercise is not possible here.

[35] The bone and stone were identified by Dr P. L. Armitage, British Museum (Natural History), and Martyn Owen, Institute of Geological Sciences, respectively.

[36] D. M. Wilson (ed.), *The Archaeology of Anglo-Saxon England* (London, 1976), 271.

[37] F. Consitt, *The London Weaver's Company* (Oxford, 1933), 1.

[38] A further four loomweights have been found in the City but are unprovenanced.

[39] A. G. Vince, Museum of London, commented on the ceramic petrology of the loomweights.

[40] E. T. Leeds, 'A Saxon village near Sutton Courtenay, Berkshire', *Archaeologia 73* (1923), 147–92; D. A. Jackson, D. W. Harding and J. N. L. Myres, 'The Iron Age and Anglo-Saxon site at Upton, Northamptonshire', *Antiq. J.*, 49 (1969), 202–21; H. Mytum, 'An impressed Anglo-Saxon loom-weight from Binton, Warwickshire', *Antiq. J.*, 61 (1981), 314–16; and W. H. Zimmermann, 'Archäologische Befunde frühmittelalterlicher Webhäuser', 109–34 in L. B. Jørgensen and K. Tidow (eds.), *Textilsymposium Neumünster* (Neumünster, 1982).

[41] The three categories were proposed by Zimmermann, op. cit in note 40.

[42] J. Collis, *Winchester Excavations, Volume III, 1949–1960* (Winchester, 1978), 33–39; C. Edwards, 'The late Saxon loomweights from Trench A in Area 8, Chapel Street', Level III Archive report, held at Chichester District Museum; and A. Down, *Chichester Excavations 5* (Chichester, 1981), 192–93.

[43] Hoffman, op. cit. in note 14, 258–61.

[44] Ibid., 135–36 and 319–21.

[45] V. Straker and A. Davis, 'Milk Street: plant remains from early medieval pits', Level III Archive report (1983), held by Museum of London.

[46] *Be Gesceadwisan Gerefan*, op. cit. in note 14; J. B. Hurry, *The Woad Plant and its Dye* (London, 1930), 53 and 276–80; E. M. Carus-Wilson, 'The English cloth industry in the late 12th and early 13th centuries', *Economic History Review*, 14, 1st series (1944), 32–50; and M. Biddle, *Winchester in the Early Middle Ages* (Oxford, 1976), 435.

[47] T. Kilbride, 'Weaving traditions in the Scottish Highlands', *Weavers Journal*, 111 (1979), 12–15.

[48] Straker and Davis, op. cit. in note 45.

[49] Zimmermann op. cit. in note 40. Four-shed broken lozenge twills, a characteristic product of the warp-weighted loom, occur in linen as well as wool although far fewer have been preserved. A notable example is the pillow cover recovered from the Sutton Hoo ship-burial, R. Bruce-Mitford, *The Sutton Hoo Ship-Burial, Vol. I* (London, 1975), 447.

[50] J. P. Wild, 'Roman and native textile technology', 123–31 in B. C. Burnham and H. B. Johnson (eds.), *Invasion and Response. The Case of Roman Britain* (Oxford, Brit. Archaeol. Rep. Brit. Ser. 73, 1979). Miss Elisabeth Crowfoot has catalogued numerous Anglo-Saxon examples, many of which remain unpublished: E. Crowfoot, 'The textiles', 98–106 in B. Green and A. Rogerson (eds.), 'The Anglo-Saxon cemetery at Bergh Apton, Norfolk', *East Anglian Archaeol.*, 7 (1978). The Anglo-Scandinavian textiles from York are described as continuing into the 11th century but no distinctions of date are made between the different types of cloth present, MacGregor, op. cit. in note 1.

[51] H. Bennett, 'The textiles', in *Perth High Street Excavations* (forthcoming); M. Hoffmann, 'Lebende Tradition als Quelle für die Erkenntnis des Gebrauches obsoleter Geräte', 97–107 in Jørgensen and Tidow (eds.), op. cit. in note 40.

[52] A. Woodger, 'The eclipse of the burel weaver: some technological developments in the thirteenth century', *Textile History*, 12 (1981), 59–76.

[53] L. B. Jørgensen, *Cloth of Prehistoric Scandinavia* (forthcoming).

[54] Hoffmann, op. cit. in note 14, 188–89.

[55] Before the collapse of the Roman Empire, it appears that this type of broken lozenge twill was imported into Scandinavia but evidence concerning the post-Roman period is equivocal: Jørgensen, op. cit. in note 53.

[56] L. B. Jørgensen, 'Cloth of the Roman Iron Age in Denmark', *Acta Archaeologia*, 50 (1979), 1–60. Finer, weft-faced, four-shed broken lozenge twills woven from Z-spun yarn have also been advocated by a number of textile historians, the first of whom was Agnes Geijer: A. Geijer, *Birka III. Die Textilfunde aus den Gräbern* (Uppsala, 1938), 40–47; recent evidence in support of this theory is advanced in A. S. Ingstad, '"Frisisk klede"? En diskusjon omkring noen fine tekstiler fra yngre jernalder', *Viking*, 43 (1979), 81–95.

[57] For example, J. P. Wild, *Vindolanda III, The Textiles* (Hexham, 1978), 28; and MacGregor, op. cit. in note 1, 111 and 130.

[58] E. Crowfoot, 'Textiles', 50–53 in P. J. Tester, 'Excavations at Fordcroft, Orpington', *Archaeol. Cantiana*, 84 (1969), 39–77; E. Crowfoot, 'The textile remains', 29–32 in C. Hills and P. Wade-Martins, 'The Anglo-Saxon cemetery at The Paddocks, Swaffham', *East Anglian Archaeol.*, 2 (1976); and P. Walton, 'Textile remains from West Heslerton Anglo-Saxon cemetery, 1978–1981', D.O.E. Interim Report (1982). The scanty amount of published evidence and lack of a long dated sequence, however, makes generalisations hazardous.

[59] MacGregor, op. cit. in note 1, 110 and 129; and H. J. Hundt, *Die Textil-und Schnurreste aus der Frühgeschichtlichen Wurt Elisenhof* (Frankfurt am Main), 18–22. Information concerning the Dublin textiles is published by permission of Pat Wallace, National Museum of Ireland.
[60] Hundt, op. cit. in note 59.
[61] A. S. Henshall, 'Textiles and weaving appliances in prehistoric Britain', *Proc. Prehist. Soc.*, new ser. 16 (1950), 130–62.
[62] However, it should be noted that at Elisenhof one band, 90 mm in width, was woven in 2/1 twill: Hundt, op. cit. in note 59, 96.
[63] An example of a reinforced selvedge on a four-shed broken chevron twill is illustrated in Schlabow, op. cit. in note 23, fig. 94.
[64] Colours were not classified in this way in Old English since degrees of brightness were stressed rather than differences of hue: N. F. Barley, 'Old English colour classification: where do matters stand?', *Anglo-Saxon England*, 3 (1974), 15–28.
[65] P. Walton, 'The textiles from 16–22 Coppergate York', in P. V. Addyman (ed.), *The Archaeology of York 17/5* (forthcoming).
[66] E. Munksgaard, *Oldtidsdragter* (Copenhagen, 1974), 186–98.
[67] A similar striped textile was recorded from a 9th-century deposit in Gloucester: Hedges, op. cit. in note 1.
[68] In Norway, this weave construction is termed *korskypert* and examples have been recorded from the mid 9th-century Oseberg ship burial and from two sites on the western seaboard. Two examples were recorded from Elisenhof and another from Brunnen, Heilbronn in South Germany (late 9th century), Hundt, op. cit. in note 59, 22–23. Single examples have also been found from *c.* 10th- to 11th-century deposits in Novgorod, Gdansk, Opole and Middelburg: A. Nahlik, *Tkaniny welniane importowane i miejscowe Nowogrodu Wielkiego X–XV wieku* (Warsaw, 1964), fig. 20; A. Nahlik, 'Tkaniny wsi wschodnioeuropejskiej, X–XIII wieku', *Acta Archaeol. Lodziensia*, 13 (1965), 1–103; and J. E. Leene, 'Beschriving van enkele Karolingische textielresten, gevonden bij de opgravingen onder de Abdij te Middelburg', 117–31 in J. A. Trimpe Burger,' Een oudheidkundig onderzoek in de Abdij te Middelburg in 1961', *Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek* (1964). A few, including the examples from Novgorod and Heilbronn, are finer and have been woven only from Z-spun yarn. Dr A. S. Ingstad kindly drew my attention to the material from Norway and Eastern Europe.
[69] This point is emphasised in contributions from Norway, Sweden, Poland, Germany and the Netherlands which comprised Part II of the Textilsymposium Neumünster, 'Textilfunde aus dem Hoch-und Spätmittelalter', 135–222 in Jørgensen and Tidow (eds.), op. cit. in note 40.
[70] Hoffman, op. cit. in note 14, 202–04.
[71] This is generally accepted by textile historians, for example E. Crowfoot, 'The textiles', 112–15 in C. Hill, M. Millett and T. Blagg, *The Roman Riverside Wall and Monumental Arch in London*, London and Middlesex Archaeol. Soc. Special Paper 3 (London, 1980).
[72] Crowfoot, op. cit. in note 71. The date of the deposit has been revised as a result of recent pottery research undertaken by the Department of Urban Archaeology, Museum of London.
[73] F. A. Pritchard, 'Textile report', in S. Campbell, 'Excavations in the Cathedral precinct: the Norman staircase and Lanfranc dormitory', *The Archaeology of Canterbury, Vol. 3* (forthcoming); E. Crowfoot, 'Textiles from the tombs of Abbot Roger II and Abbot Dygon', D.O.E. Report; Macgregor, op. cit. in note 1; P. Walton, op. cit. in note 65.
[74] Geijer, op. cit. in note 56; A. Kjellberg, 'Medieval textiles from the excavations in the old town of Oslo', 136–49 in Jørgensen and Tidow (eds), op. cit. in note 40.
[75] P. Walton, pers. comm.; M. Lindstrom, 'Textilier', 279–92 in A. W. Mårtensson, 'Uppgrävt förflutet för PK–banken i Lund', *Archaeol. Lundienisa*, 7 (1976), 83.
[76] Hägg, op. cit. in note 21.
[77] Crowfoot, op. cit. in note 73; N. Moore, 'Les tissus de la tombe de l'abbé Victor, Salle Capitulare, St-Martin-de-Boscherville' (forthcoming).
[78] E. Carus-Wilson, 'Haberget: a medieval textile conundrum', *Medieval Archaeol.*, 13 (1969), 148–66.
[79] Cambridge, Trinity College MS.0.9.34, f.32v reproduced in D. Hartley and M. M. Elliot, *Life and Work of the People of England, A.D. 1000–1300* (London, 1931), pl. 22b.
[80] G. M. Eastwood, 'Textiles from Quseir al-Qadim, Egypt', 41–44 in C. Rodgers (ed.), *Early Islamic Textiles* (Brighton, 1983).
[81] Carus-Wilson, op. cit. in note 78.
[82] A. G. Christie, *English Medieval Embroidery* (Oxford, 1938), 31–32.
[83] MacGregor, op. cit. in note 1, 132–36. In Dublin, where a larger number of headdresses is preserved, a greater variety of silk tabbies is apparent: F. A. Pritchard, 'Silks of the Viking Age from Dublin', in B.Magnus (ed.), *Textilsymposium Bergen* (forthcoming).
[84] R. S. Lopez, 'Silk industry in the Byzantine empire', *Speculum*, 20 (1945), 1–42.
[85] C. R. Dodwell *Anglo-Saxon Art* (Manchester, 1982), 149–53.
[86] Ibid., 152.
[87] W. Sparrow Simpson (ed.), 'Two inventories of the Cathedral church of St Paul, London', *Archaeologia*, 50 (1887), 439–524.
[88] This part of the discussion was contributed by Donald King.

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