

Evidence of wood, horn and leather associated with metalwork from the Anglo-Saxon cemetery at Wasperton, Warwickshire.

Esther Cameron¹

Summary

This report deals with inhumations dating from the 5th –7th centuries excavated in the mid 1980s in advance of gravel extraction. It is concerned with the identification and interpretation of evidence for organic materials (other than textile) among the objects inhumed. Evidence for wood, leather, horn and twisted yarn was found in association with shields, spears, knives, buckles and containers.

Keywords

Anglo-Saxon

Metalwork

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¹ Esther Cameron: Oxfordshire Museums Resource Centre, Cotswold Dene, Witney Road, Standlake, OX29 7QG.

Tel: 01865 861526

E-mail: esther.cameron@arch.ox.ac.uk

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Introduction

The material studied is from 41 out of a total 215 inhumations of the 5th – 7th centuries. Traces of wood, horn and leather preserved on metalwork found in the graves are parts of 58 composite items catalogued in this report.

Since excavation the ironwork deteriorated in storage and is now in poor condition. The cleaning, consolidation and packaging of these finds in the past has been detrimental to the preservation of organic material and its analysis. In assessing the assemblage some years ago Glynis Edwards (English Heritage) recorded traces of wood and leather on 160 items of metalwork but by 2005 less than 36% of this number had potential for sampling, identification and interpretation either due to loss or deterioration of the evidence. In many cases this was caused by the organic evidence having fallen away from the metalwork, or from it having been consolidated to keep it in place.

Mineral preserved organic materials

Wasperton's organic remains are mineralised and the level of preservation is average to poor, sometimes crumbling to powder when disturbed. 56 samples were gold-coated and examined under a JSM840F scanning electron microscope (SEM).² SEM helped in the identification of woods and in confirming the identity of horn or suspected leather but the level of preservation affected handling, sample preparation and identification. The potential and methodology of studying the evidence of mineral preserved organic remains is described by Watson (1988).

For this site in general, the survival of skin or leather is particularly poor and evidence for it is scarce because the well-drained gravels did not favour its preservation. Several samples from deposits that looked at first to be skin-like were found to be natural formations of iron oxides, or were compressed and damaged wood. The terms 'possible' and 'probable' are deliberately used in the tables of identified material as a confidence rating. 'Possible' leather is a term used to *interpret*, rather than identify, an amorphous layer in a plausible position. 'Probable' leather, on the other hand, generally has a fibrous quality as well as its shape and position to suggest a skin

² At facilities based at the Department of Materials (Begbroke), Oxford University.

product, and is half-way to being identified. In this report, the term ‘leather’ is used when the evidence is strong (a more precise explanation of terminology is given in Cameron and Edwards 2004, 1–3).

The wood is in a better state of preservation than the leather, but as it does not survive in quantity and because of its crumbly nature, the three sections normally required for species identification were not always available. In this case, the terms ‘possible’ and ‘probable’ indicate that although several (or a few) of the characters are missing the remaining evidence supports the identification.

Weapons

Shields

The remains of shields were found in graves 6, 9, 10, 22, 23, 33, 44, 48, 58, 60, 63, 64, 68, 73, 75, 90, 91, 103, 104, 115, 135 and 146. Seventeen of these had wood remains which are tabled here and described in the catalogue.

Identification of woods from shields

grave/index	sample	wood id. <i>definitely</i>	wood id. <i>probably</i>	wood id. <i>possibly</i>
G.10 F246 1328/9	28			lime
G.22 F289 1223/5	53	lime		
G.23 F294 1221/5,12	30	alder		
G.44 F378 1325/1	32	alder		
G.58 F1000 2300/2	34		alder	
G.60 F1005 2304/2	35			willow/poplar
G.63 F1008 2306/3,5	37		lime	
G.64 F1009 2336/3	55	lime		
G.73 F1077 2402/1,4	-	-	-	-
G.75 F1079 2404/1-3	40	alder		
G.90 F1535 3134/2,3,10	29			alder
G.91 F1537 3139/2	41	alder		
G.103 F1557 3213/2	43			willow/poplar
G.104 F1558 3214/2	44			willow/poplar
G.115 F1582 3266/2	45		willow/poplar	
G.135 F3028 3343/2	47			lime
G.146 F3068 3446/2-5	48			willow/poplar

Shield boards at Wasperton were made from any of three species of wood – alder (6), willow/poplar (5) and lime (5). These three woods have similar properties in that they are moderately lightweight and soft but not splintery. Alder and willow/poplar were most commonly used for shields in southern England during the Early Anglo-Saxon

period, and lime was also used frequently (Dickinson and Härke 1993, 48–9; Watson 1994, 37).

Variations in the thickness of the boards, from 5–10mm, are within the range found elsewhere and do not appear to be related to the type of wood used. The dimensions of some rivets associated with shields, but not attached to the iron boss, suggest that some boards might have been cross-braced or mended (graves 22, 23 and 135). The range of handle construction conforms to published types and includes two specific forms, the A1 with a lap-joint, and D-types with the handle and board of one piece. D-types were found at Wasperton in graves 23, 73 and 90. According to Dickinson and Härke the occurrence of this type is chronologically limited to the late fifth to early seventh century, and associated with wealth (1993, 36–8).

Some of the iron grips also have remains of bindings either of cord, leather or textile (see table below). The bindings on three grips from graves 23, 44 and 73, of a distinctive type of cord ‘whipping’, involving cords of 1.5mm diameter (see P. Walton’s textile report, P.00), are similar to another example from grave 56, Wakerley, Northamptonshire (Adams and Jackson 1988, microfiche D5, fig.55). At Wasperton, the survival of only one example of a leather-like binding (grave 60) may be due to a bias of preservation because shield-grips with leather bindings are commonly found in cemeteries of this date across southern England (Dickinson and Härke, 1993, 36). However, the evidence suggests that the grips from graves 75, 91 and 103 were bound with textile (see P. Walton’s textile report, P.00), a practice considered by Dickinson and Härke to be rare (1993, 36).

Leather or hide had been used to cover the fronts of shield-boards from graves 10, 22, 90 and, possibly, grave 75. Evidence for hide on the reverse side of the shields was looked for but not found.

grave/index	wood	board thickness (flange rivets)	board thickness (other rivets)	grip/wood construction	grip binding	hide (outside)
G.10 F246 1328/9	lime	-	-	A1	-	▲
G.22 F289 1223/5	lime	-	13mm	-	-	▲
G.23 F294 1221/5,12	alder	-	20mm	D	cords (coarse 2-ply)	-
G.44 F378 1325/1	alder	-	7mm	A, B or C	cords (coarse 2-ply)	-
G.58 F1000 2300/2	alder	6mm	-	A1	-	-
G.60 F1005 2304/2	willow/ poplar	-	-	-	hide? w20mm	-
G.63 F1008 2306/3,5	lime	-	-	A, B or C		-
G.64 F1009 2336/3	lime	-	-	-	-	-
G.73 F1077 2402/1,4	-	-	-	D	cords (coarse)	-
G.75 F1079 2404/1-3	alder	-	-	-	textile w20mm	possibly
G.90 F1535 3134/2,3,10	alder	6mm	-	D	-	▲
G.91 F1537 3139/2	alder	6mm	-	A1	textile	-
G.103 F1557 3213/2	willow/ poplar	5mm	-	A1	textile w14mm	-
G.104 F1558 3214/2	willow/ poplar	6mm	-	A1	-	-
G.115 F1582 3266/2	willow/ poplar	-	-	A or B	-	-
G.135 F3028 3343/2	lime	5mm	10mm	A	-	-
G.146 F3068 3446/2-5	willow/ poplar	10mm	-	A, B or C	-	-

Details of shield construction

Spears

Wood from the sockets of 16 spearheads and ferrules was identified, of which 10 were of hazel and 6 of ash. This was an appropriate selection of woods as both species are hard, tough and flexible. The same two species predominated among spears buried at Edix Hill, Cambridgeshire (Malim and Hines 1998, 231) and generally this seems to be the norm although examples of willow/poplar spears have been found

elsewhere.³ No observations on the use of round or mature woods were possible due to the small amounts of evidence preserved in the sockets.

Grave/index	Sample	wood id. <i>definitely</i>	wood id. <i>probably</i>	wood id. <i>possibly</i>
G.6 F237 1218/2,9	16	hazel		
G.9 F241 1326/4	9	-	-	-
G.10 F246 1328/1	3	ash		
G.22 F289 1223/2	4		hazel	
G.23 F294 1221/1	2	hazel		
G.33 F340 1251/2	15			hazel
G.44 F378 1325/2	5	ash		
G.55 F419 1421/4,5	8 & 1			ash
G.60 F1005 2304/1	10		hazel	
G.71 F1036 2331/1	6		hazel	
G.73 F1077 2402/7	11		hazel	
G.83 F1522 3116/1	57		ash	
G.104 F1558 3214/1	14			hazel
G.108 F1570 3228/1	12			ash
G.135 F3028 3343/1	7			hazel
G.142 F3050 3390/1	13		hazel	
G.161 F3098 3542/1	56	ash		

Identification of woods from spear-heads

Personal items

Knife sheaths and handles

Traces of sheaths and handles were found on 8 ‘whittle-tang’ knives, types which have organic handles pushed onto the iron tang. 7 knives have remains of handles identified as horn, the most common hafting material for blades of early medieval date. The remains of leather sheaths were found on 3 blades and there are traces of possible leather on another 2. The evidence, although slight, suggests that the design of these sheaths is similar to others of this date, with leather 1–2mm in thickness enclosing the handle as well as the blade, and a seam positioned at the cutting edge (Cameron 2000, 53-4).

Grave/index	leather sheath remains	handle
G.15 F270 1257//7	traces, 2 layers join at edge	horn
G.18 F275 1277/6	-	horn
G.33 F340 1251/5	on each face and slightly overlapping handle, 2 layers join at edge	horn

³ Spears of willow/poplar are recorded from Anglo-Saxon cemeteries at Eppingham, Rutland; Castledyke South, Barton-on-Humber and at Beckford, Hereford and Worcester (Timby 1996, 85; Drinkall and Foreman 1998, 250; Evison and Hill 1996, 70-1).

G.48	F385	1344/5	trace of 'possible' leather	-
G.63	F1008	2306/4	-	horn
G.64	F1009	2336/5	on one face and knife back	horn
G.71	F1036	2331/1	-	horn
G.90	F1535	3134/6	trace of 'possible' leather	horn

Leather and horn on knives

Buckles and belts

The evidence for leather belts is not strong (see table below). Mineralised remains, suspected to be of leather were examined on 6 buckles, 4 of which turned out to be textile and not from belts at all. The remaining two are interpreted as 'possible' leathers on and between attachment plates (grave 10) and between a tongue and loop (grave 23). The evidence for leather belts and other forms of harness from the Early Anglo-Saxon period is relatively abundant but lacking in technological and stylistic detail.⁴

Grave/index	type of evidence	position on buckle
G.10 F246 1328/12	possible leather	on and inside buckle attachment plate
G.23 F294 1221/7	possible leather	between tongue and loop of buckle

Evidence for leather belts

Containers

Buckets and vessels

Wood from inside a metal clip from grave 24, possibly from the rim of a turned wood vessel, could not be identified. The wooden staves of a bucket from graves 57, and fragments of what might have been a bucket or vessel in grave 97, were identified as yew.⁵ Yew is a durable wood with an attractive finish, used historically for furniture and tool-handles, and favoured in the Anglo-Saxon period for copper alloy-bound buckets. Identified wood species from all types of buckets of the Early Anglo-Saxon period include 43 of yew, with ash, buckthorn, oak, maple and a variety of softwoods making up another 19 (Cook 2004, 34). Interestingly, the bucket from grave 57 is bound with iron as well as copper alloy, and iron-bound buckets commonly have oak staves rather than yew (Malim and Hines 1998, 233).

⁴ But see, for example, evidence of a seventh-century belt decorated with parallel grooved lines from grave 968, Buttermarket, Ipswich and a sixth-century horse harness from Mound 17, Sutton Hoo (Cameron and Edwards 2004, 6; Carver 2005, 221–243, figs.111–113).

⁵ The remains of another copper alloy-bound bucket from grave 161, mentioned by Cook (2004, 100), were not seen by EC.

Grave/index			Sample	wood id. <i>definitely</i>	wood id. <i>probably</i>	wood id. <i>possibly</i>
G.24	F302	1230/8	50	-	-	-
G.57	F421	1442/2,3,7	33	yew		
G.97	F1550	3196/24	51		yew	

Identification of woods from buckets or vessels

Miscellaneous

Wood associated with a long copper-alloy rivet from grave 23 (1221/2) could not be identified.

Catalogue of material examined

Sample numbers are shown in parentheses

- G.6** F237 1218/2,9 Iron spearhead with wood remains inside the socket, identified as hazel, *Corylus avellana* (16).
- G.6** F237 1218/13 Iron disc/stud associated with shield, wood remains on the back, single grain direction, not enough to sample.
- G.9** F241 1326/4 Iron ferrule (from a spear) with wood remains in the socket, degraded (unable to identify) (9).
- G.10** F246 1328/1 Iron spearhead with wood remains inside the socket identified as ash, *Fraxinus excelsior* (3).
- G.10** F246 1328/12 Iron buckle attachment plate, with powdery yellow deposit inside and another deposit on one outer surface, possibly of leather but in neither case was this confirmed by SEM (21 and 22).
- G.10** F246 1328/9 Shield boss and grip. Beneath the rim of the boss, wood grain in two directions indicating a lap-joint; handle construction type A1;⁶ the wood identified as possibly lime, *Tilia* sp. (28). A deposit (27) between the wood and the rim of the boss was confirmed (by SEM) as a possible skin product, which suggests that the front of the board was covered with hide.
- G.15** F270 1257/7 Iron knife with remains of a horn handle and traces of a leather sheath on the blade with two layers joining at the edge of the blade.
- G.18** F275 1277/6 Iron knife with remains of a horn handle on the tang (18).

⁶ Dickinson and Härke 1992, 37

- G.22** F289 1223/2 Iron spearhead with wood remains inside the socket identified as probably hazel, *Corylus avellana* (4).
- G.22** F289 1223/5 Iron disc/stud (shield fitting) with remains of wood and leather on the back. The wood, identified as lime, *Tilia* sp. has a uniform grain direction and a total thickness of 13mm (53). Traces of skin between the wood and the iron disc suggest that the outer surface of the board was covered with hide.
- G.23** F294 1221/1 Iron spearhead with wood remains inside the socket identified as hazel, *Corylus avellana* (2).
- G.23** F294 1221/2 Copper-alloy stud with wood remains around the shank all of one grain direction. The head of the stud is flat and circular (D.24mm) and the shank is complete (D.2mm) indicating a wood thickness of 20mm or more. The wood could not be identified (49).
- G.23** F294 1221/5,12 Iron shield-boss, and grip with slightly splayed ends. Wood beneath the rim of the boss is all in one grain direction and identified as alder, *Alnus* sp. (30). Wood grain beneath the grip is transverse, indicating a D-type handle construction. On the front of the grip, a cord binding, cord diam.1.5mm, Z-twist.
- G.23** F294 1221/7 Iron buckle and plate with two rivets, fallen apart. The substance between the plates has been consolidated and most other remains on and around the loop and on the back are of textile. But a deposit between the tongue and loop of the buckle was confirmed as having possible skin structures, suggesting that the strap was of leather (23).
- G.24** F302 1230/8 Copper-alloy riveted plate, bent double with a U-shaped cross-section, associated with two shrivelled, black fragments described as leather. These are 4mm wide, 1–2mm thick and resemble curled bits of thong, one 7mm the other 12mm in length. The copper-alloy could be a clip from the rim of a vessel but does not have a pronounced curve. The two organic fragments, which are of wood, fit inside the rim and could be vessel remains; the wood could not be identified (50).
- G.33** F340 1251/2 Iron spearhead with wood remains inside the socket identified as possibly hazel, *Corylus avellana* (15).
- G.33** F340 1251/5 Iron knife with remains of a horn handle and a leather sheath. The leather survives on each face of the blade, and although incomplete the evidence suggests that the sheath was seamed at the cutting edge and overlapped the handle.
- G.44** F378 1325/2 Iron spearhead with wood remains inside the socket identified as ash, *Fraxinus excelsior* (5).
- G.44** F378 1325/1 Iron shield-boss with wood beneath the rim identified as alder, *Alnus* sp. (32) and possibly a trace of leather

although this was not confirmed by SEM (31). The wood and iron rivets show that the board was 6–7mm thick. On the back of the grip, wood grain direction is longitudinal at the centre, transverse at either end, indicating handle construction types A, B or C. On the front of the grip, a cord binding, cord diameter 1.5mm, Z-twist.

G.48 F385 1344/5 Iron knife, the surface detached and in fragments. Organic remains on detached fragments are of textile with a trace of possible skin or leather although this was not confirmed by SEM (20).

G.55 F419 1421/4,5 Iron spearhead and ferrule, with wood remains inside both sockets identified as possibly ash, *Fraxinus excelsior* (1 and 8).

G.57 F421 1442/2,3,7 Wooden bucket with metal fittings, in fragments. The rim, handle mounts and lower bands are of iron while the upper band and curving escutcheons are of copper alloy. Wood remains attached to parts of the rim and mounts identified as yew, *Taxus baccata* (33). The thickness of wood near the bottom of the bucket (at the level of the escutcheons) is 7mm tapering to 3mm at the rim. The width of one of the staves appears to be 38mm. Organic remains of textile mixed with short fragments of woody stalks are also preserved on one handle mount and parts of the lower bands, as though one side of the bucket had pressed against them in burial. The orientation of the stalks is random and they vary in width from 2–7mm; the smallest are circular in cross-section, the largest are flat. They are consolidated with PVA.

G.57 F421 1442/6 Iron buckle with textile remains across the loop and tongue.

G.58 F1000 2300/2 Shield-boss with wood remains beneath the rim in two grain directions, representing the shield board and grip, identified as probably alder, *Alnus* sp.(34). At present there are two grips associated with this shield-boss. One is a separate fragment, with one of its rivets still attached to the underside of the boss. The grain direction of wood beneath this grip is longitudinal and this fits the evidence on the boss where the two woods can be seen at right angles to each other in a lap-joint, indicating handle construction type A1. The wood and rivets also indicate that the board was 6mm thick. There are textile remains on the outer face of this grip.

The second grip, with horn-like extensions at either end, also has wood on the back (ends only) with transverse grain direction. Handle construction uncertain, possibly simple.

G.60 F1005 2304/1 Iron spearhead with wood inside the socket identified as probably hazel, *Corylus avellana* (10).

G.60 F1005 2304/2 Iron shield-boss with remains of wood and a grip with a possible leather binding. The wood beneath the rim of the boss, identified as possibly willow/poplar, *Salix/Populus* sp. follows a single grain direction and belongs to the shield board (35). The grip has been mounted onto a piece of modern board for museum display and the back is not visible. On the front of

the grip, three obliquely aligned straps, width 20mm, possibly of leather, although this was not confirmed by SEM (36).

G.63 F1008 2306/3,5 Iron shield-boss and grip. Wood beneath the rim of the boss, single grain direction, identified as probably lime, *Tilia* sp. (37). On the back of the grip, wood grain direction longitudinal at the centre, transverse at the ends, suggesting handle construction type A, B or C. A deposit on the back of the grip, between the iron and wood, possibly of skin or leather but not confirmed by SEM (38).

G.63 F1008 2306/4 Iron knife with traces of horn on the tang.

G.64 F1009 2336/3 Iron shield grip. Wood from the back is detached and in fragments, identified as lime, *Tilia* sp. (55).

G.64 F1009 2336/5 Iron knife with remains of a horn handle and leather sheath. The leather deposit covers one face of the blade and the knife-back.

G.64 F1009 2336/6 Iron buckle with copper-alloy plate, fragmented. Organic remains are mostly textile although two fragments remain unidentified (25).

G.68 F1023 2330/1,2,4,6 Iron shield-boss, two grips and a disc possibly from the front of the shield board, in fragments. Wood remains on the backs of the grips are slight and have been consolidated. The first has transverse wood grain at each end, insufficient to specify the type of handle construction. The second is described with the boss from grave 135.

G.71 F1036 2331/1 Iron spear-head with wood inside the socket, identified as probably hazel, *Corylus avellana* (6).

G.71 F1036 2331/2 Iron knife with traces of a horn handle on the tang.

G.73 F1077 2402/1,4 Iron shield-boss, grip, and a disc from the front of the board, but not enough wood to sample. There are traces of wood on the back of the grip, grain direction transverse, suggesting a D-type handle construction. On the front of the grip, a cord binding (trace), cord diameter 1.5mm, covered with textile.

G.73 F1077 2402/7 Iron spear-head with wood inside the socket identified as probably hazel, *Corylus avellana* (11).

G.75 F1079 2404/1-3 Iron shield boss in fragments with two iron discs from the front of the board, detached fragments of wood and a broken grip with possible textile binding. Wood beneath the rim of the boss, identified as alder, *Alnus* sp.(40). A layer of possible leather on the large disc /3 implies that the outside of the board was covered with hide, although this was not confirmed by SEM (39). On the back of the grip, traces of wood in a transverse

direction at either end, handle construction non-specific. On the front of the grip, a binding strip, width 20mm, and further evidence of textile.

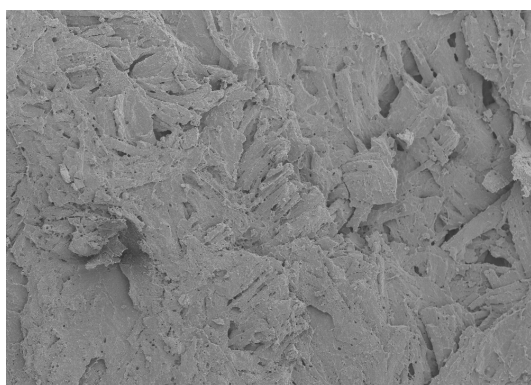
- G.83** F1522 3116/1 Iron spear-head with wood inside the socket identified as probably ash, *Fraxinus excelsior* (57).
- G.90** F1535 3134/6 Iron knife with traces of a horn handle on the tang. Evidence of a possible leather sheath on the blade, not confirmed by SEM (19).
- G.90** F1535 3134/2,3,10 Iron shield-boss in fragments, with a grip and iron discs from the front of the board. Traces of wood and leather beneath the rim of the boss and on the iron discs indicate that the board was 6mm thick and its outer face covered with leather. Transverse wood grain on the back of the grip, identified as possibly alder, *Alnus* sp.(29), suggests a D-type handle construction.
- G.91** F1537 3139/2 Iron shield-boss, grip, three rivets (from the rim) and detached fragments of wood. Wood beneath the rim of the boss and corresponding remains on the back of the grip indicate that the shield board was 6mm thick and made of alder, *Alnus* sp.(41). The wood on the grip is mostly longitudinal, but at one end the wood is in two layers, which suggests a lap-joint and handle construction type A1. There is a textile wrapping on the grip.
- G.91** F1537 3139/2 Iron shield-boss fragments and grip. The thickness of the shield board was 5mm, possibly of willow/poplar *Salix/Populus* sp.(43). Organic remains on the back of the grip are of wood only (42). The direction of the wood on the grip is longitudinal and there is evidence at one end of a lap-joint, handle construction type A1. On the front of the grip, two obliquely aligned strips of textile, width 14mm.
- G.97** F1550 3196/24 Copper-alloy object described as a 'girdle-hanger' but could be a bucket fitting, and fragments of thin copper-alloy sheet (with holes for rivets) and a rivet. With them are three organic remains:
1. A compressed rectangular mass 15x20x4mm comprising two layers of fragmented copper-alloy sheet, soil and plant roots consolidated with PVA.
 2. A copper alloy rivet, L.5mm, with black organic matter attached, shrivelled to 2mm thick. The organic matter cannot be leather because it has a grain direction and is most probably wood.
 3. A separate fragment of black organic matter of similar appearance to 2, with a hole for a rivet, identified as probably yew (*Taxus baccata*) (51).
- G.103** F1557 3213/2 Iron shield boss and grip. On the front of the grip, two oblique strips 13–14mm wide with a woven structure, probably textile. On the back, wood in two directions with an overlap at the rivets, indicating a lap-joint. The wood and rivets suggest a board thickness of 5mm, possibly willow/poplar *Salix/Populus* sp (43). A yellow ochreous layer beneath the wood on the grip consists of wood structures only (not leather) (42).

- G.104** F1558 3214/1 Iron spear-head with wood inside the socket identified as possibly hazel, *Corylus avellana* (14).
- G.104** F1558 3214/2 Iron shield-boss fragments and grip. Wood beneath the rim of the boss indicates a board thickness of 6mm, possibly willow/poplar, *Salix/Populus* sp.(44). Wood grain on the back of the grip is longitudinal, and there is evidence at one end of a lap-joint; handle construction A1. On the front of the grip, environmental debris, possibly including grass and straw (stalk diam.1mm).
- G.111** F1575 3247/8 Iron buckle and attachment plate, incomplete. A yellow powdery deposit between the plates contains no evidence of organic structures (24). Organic remains on the back of the plate (presumed facing the body) are of textile.
- G.115** F1582 3266/2 Iron shield-boss, fragment of grip and detached wood identified as probably willow/poplar, *Salix/Populus* sp. (45). Among the pieces, a wood fragment with two grain directions, suggesting a lap-joint, handle construction A or B.
- G.115** F1582 3266/6 Iron knife with remains of a horn handle on the tang.
- G.135** F3028 3343/2 Iron shield-boss and two discs from the front of the board with wood identified as possibly lime, *Tilia* sp. (47). Rivets and wood beneath the rim of the boss indicate a board thickness of 5mm, although the evidence on the two discs suggests that it had a total thickness of 10mm. The wood remaining on the discs has a single grain direction. A mineralised layer attached to the underside of the boss is of decayed wood (not leather) (46).
A note with the shield-boss explains that a fragment of grip, possibly associated with this boss, but without a number, is stored with the shield-boss from grave 68. This fragment is from an end of a grip and has wood in two directions around a rivet (but no total thickness); handle construction A.
- G.135** F3028 3343/1 Iron spear-head with wood inside the socket, identified as possibly hazel, *Corylus avellana* (7).
- G.142** F3050 3390/1 Iron spear-head with wood inside the socket identified as probably hazel, *Corylus avellana* (13).
- G.146** F3068 3446/1 Iron spear-head with wood inside the socket (not enough to sample).
- G.146** F3068 3446/2-5 Iron shield-boss, grip and two detached rivets. Wood from beneath the rim of the boss identified as possibly willow/poplar, *Salix/Populus* sp. (48). The dimensions of the loose rivets and of the grip with flanged edges, suggest a board thickness of 10mm. On the back of the grip the wood grain is longitudinal in the centre, transverse at the ends (handle construction A, B or C). On the front of the grip, textile remains.
- G.146** F3068 3446/6 Iron knife with remains of a horn handle on the tang.

- G.155** F3085 3484/6 Iron knife fragments. Organic remains on the tang are of horn; on the blade, textile.
- G.161** F3098 3542/1 Iron spear-head with wood inside the socket identified as ash, *Fraxinus excelsior* (56).
- G.161** F3098 3542/8 Iron buckle with copper-alloy plate. A deposit between the plates contains no structures of organic remains (54). Other organic remains on the buckle are of textile.
- G.169** F3110 3614/6 Iron knife fragment with traces of horn on the tang (the so called 'wooden scabbard' is a horn handle).

References

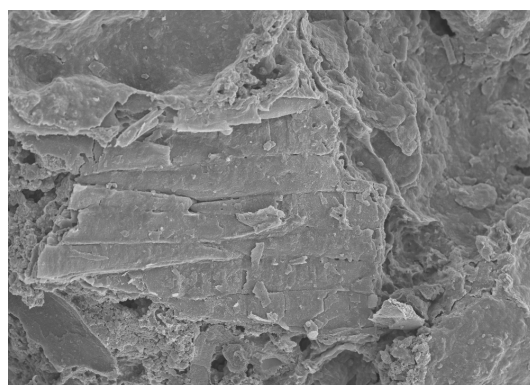
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150x, 10kV, 18mm, wasperton 27

200 µm

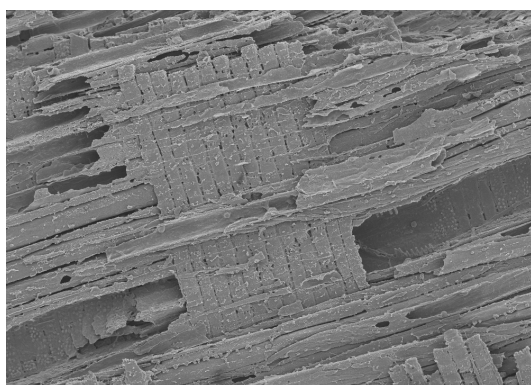
a. Possible skin covering the wooden shield, grave 10.



800x, 10kV, 17mm, wasperton 46

30 µm

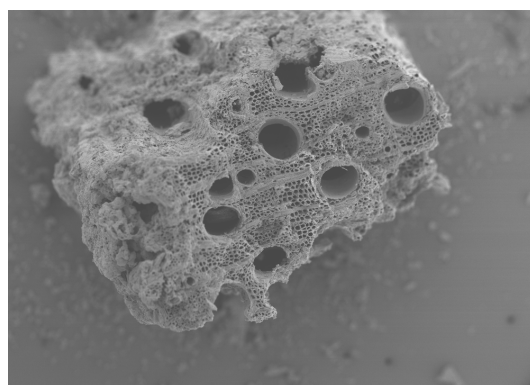
b. Compressed wood (not leather) on a shield, grave 135.



200x, 10kV, 18mm, wasperton 32

100 µm

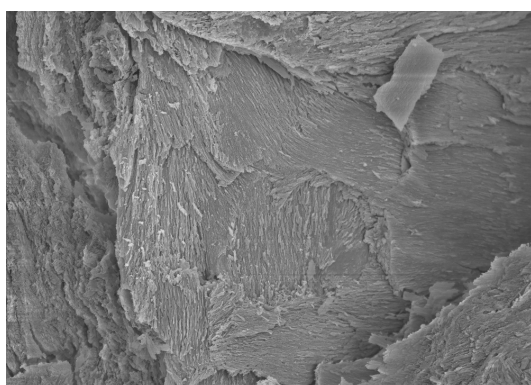
c. Alder wood shield-board, grave 44



55x, 10kV, 8mm, wasperton 3

500 µm

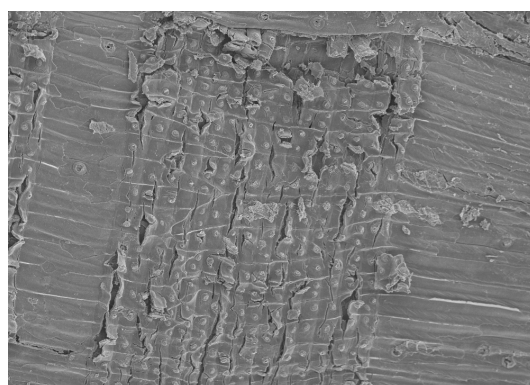
d. Ash wood spear, grave 10



1500x, 10kV, 18mm, wasperton 18

20 µm

e. Horn knife-handle, grave 18



250x, 10kV, 18mm, wasperton 33

100 µm

f. Yew wood bucket stave, grave 57