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THE BARN, COURT FARM, AYLTON, HEREFORDSHIRE
TREE-RING ANALYSIS OF TIMBERS

SCIENTIFIC DATING REPORT

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Tree-Ring Analysis of Timbers from the Barn, Court Farm, Aylton, Herefordshire

Dr Martin Bridge

Summary

Twelve timbers associated with the primary construction phase of the barn were sampled, including crucks, posts, braces, and wallplates. Nine of these timbers were subsequently dated. They appear to form a single group of timbers, most likely felled within a short period. Two timbers retained complete sapwood, both being felled in the winter of AD 1502/3, and it seems likely therefore that the barn was constructed in AD 1503, or within a year or two after this date.

Keywords
Dendrochronology
Standing Building

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Introduction

The Barn, Court Farm, Aylton (NGR SO 65791 37677; Fig 1) is a Grade II*-listed medieval tithe barn on the English Heritage Buildings at Risk register. The current barn has six bays, containing five pairs of original cruck blades, the two northern pairs of crucks being thought to be later. The barn is thought to be of fourteenth- to fifteenth-century origin. There is an eighteenth-century cowshed attached to the southern end of the building.

Dendrochronological dating of the original timbers of the barn was requested by John Yates, Historic Buildings Inspector, to inform a proposed major programme of repairs.

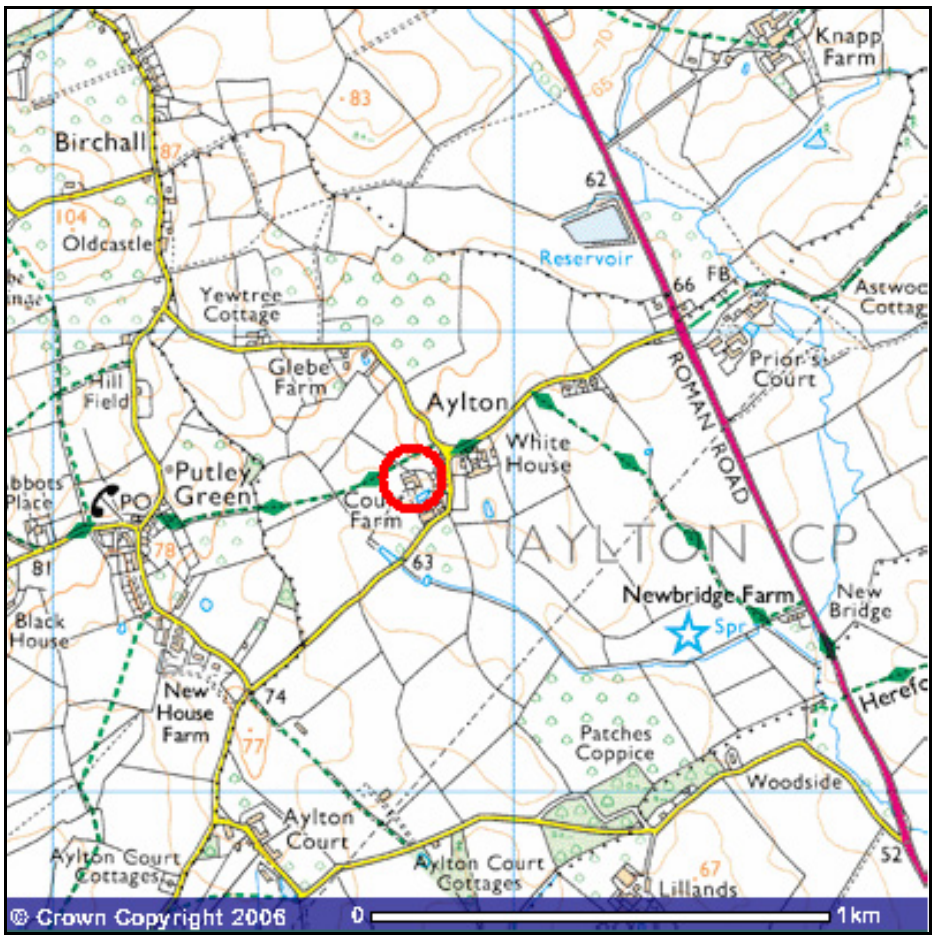

Figure 1: Map showing the location of the Barn, Court Farm, Aylton.

Methodology

The site was visited in February 2006. In the initial assessment, accessible oak timbers with more than 50 rings and traces of sapwood were sought in order to maximise the dating potential, although slightly shorter sequences are sometimes sampled if little other material is available. Those building timbers judged to be potentially useful were cored using a 15mm auger attached to an electric drill. The cores were glued to wooden laths, labelled, and stored for subsequent analysis.

The cores were prepared for measuring by sanding, using an electric belt-sander with progressively finer grit papers down to 400 grit. Any further preparation necessary, eg where bands of narrow rings occurred, was done manually. Suitable samples had their tree-ring sequences measured to an accuracy of 0.01 mm, using a specially constructed system utilising a binocular microscope with the sample mounted on a travelling stage with a linear transducer linked to a PC, which recorded the ring widths into a dataset. The software used in measuring and subsequent analysis was written by Ian Tyers (1999). Cross-matching and dating was accomplished by a combination of visual matching and a process of qualified statistical comparison by computer. The ring-width series were compared for statistical cross-matching, using a variant of the Belfast CROS program (Baillie and Pilcher 1973). Ring sequences were plotted to allow visual comparisons to be made between sequences on a light table. This method provides a measure of quality control in identifying any errors in the measurements when the samples cross-match.

In comparing one sequence or site sequence against another, *t*-values over 3.5 are considered significant, although in reality it is common to find *t*-values of 4 and 5 which are demonstrably spurious because more than one matching position is indicated. For this reason, it is necessary to obtain some *t*-values of 5, 6, and higher, and for these to be well replicated from different, independent chronologies and with local and regional chronologies well represented, unless the timber is imported. Where two individual sequences match with a *t*-value of 10 or above, and visually exhibit exceptionally similar ring patterns, they most likely came from the same parent tree.

When cross-matching between samples is found, their ring-width sequences are averaged to form an internal 'working' site mean sequence. Other samples may then be incorporated after comparison with this 'working' master until a final site sequence is established. This is then compared with a number of reference chronologies (multi-site chronologies from a region) and dated individual site masters in an attempt to date it. Individual long series which are not included in the site mean(s) are also compared with the database to see if they can be dated.

The dates thus obtained represent the time of formation of the measured rings in each sample. These dates require interpretation for the construction date of the phase under investigation to be determined. An important aspect of this interpretation is the estimate of the number of sapwood rings missing. The sapwood estimates used here are based on those proposed for this area by Miles (1997a), in which 95% of oaks contain 11–41 rings. Where complete sapwood or bark is present, the exact date of tree felling may be determined.

The dates derived for the felling of the trees used in construction do not necessarily relate directly to the date of construction of the building. However, evidence suggests that, except in the reuse of timbers, construction in most historical periods took place within a very few years after felling (Salzman 1952; Hollstein 1965).

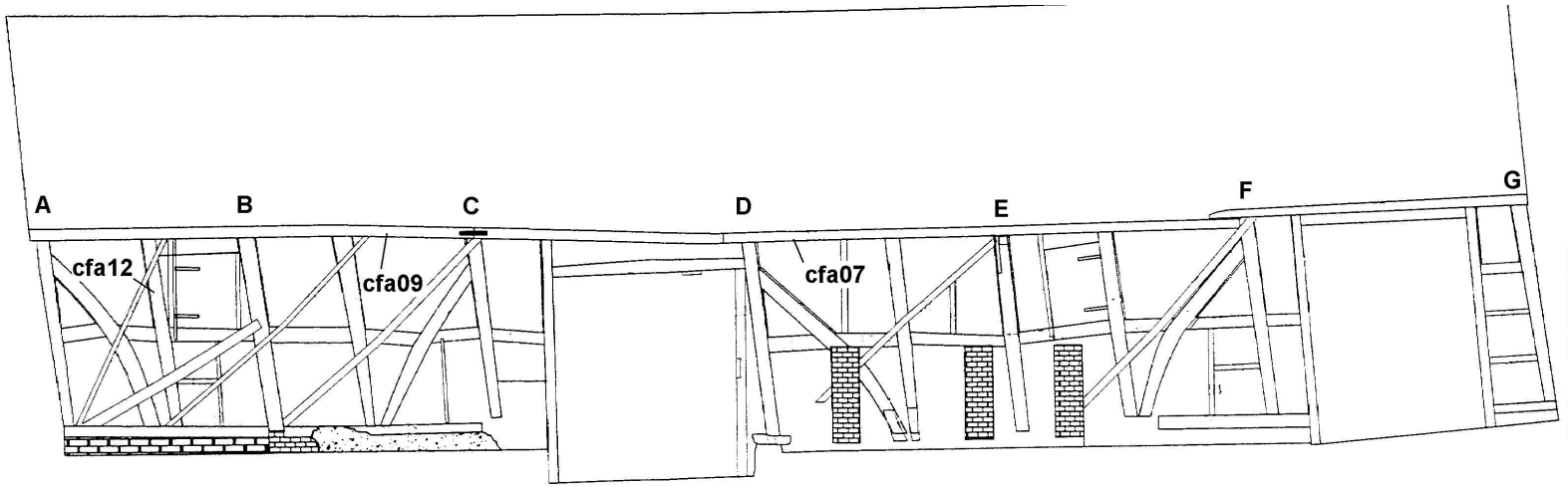

Figure 2: Internal elevation of the west wall showing timbers sampled for dendrochronology

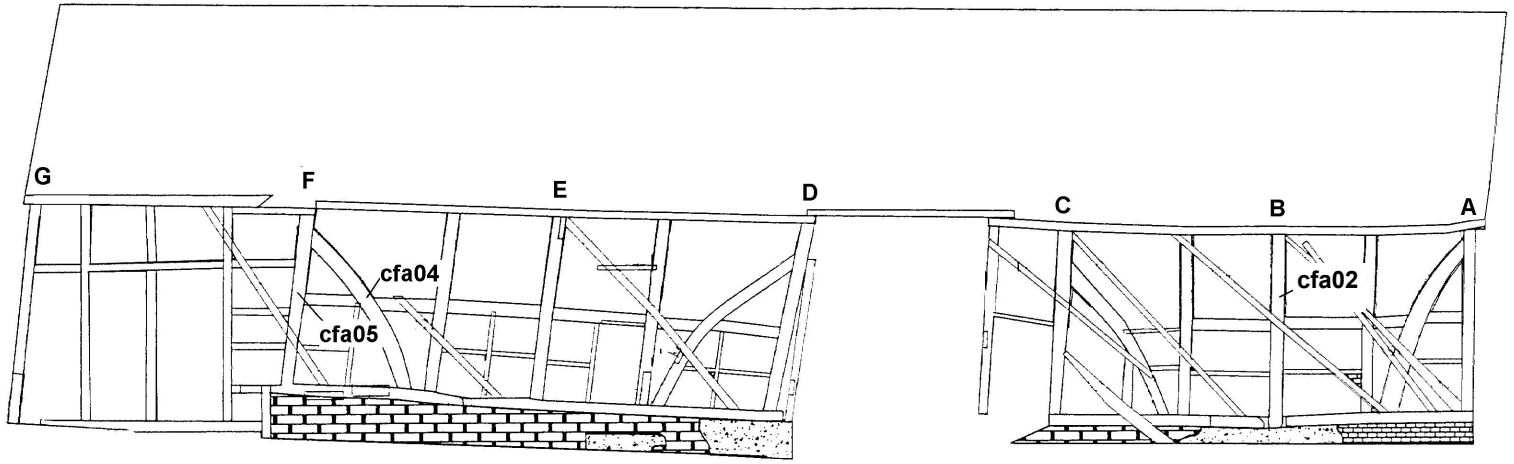

Figure 3: Internal elevation of the east wall showing timbers sampled for dendrochronology

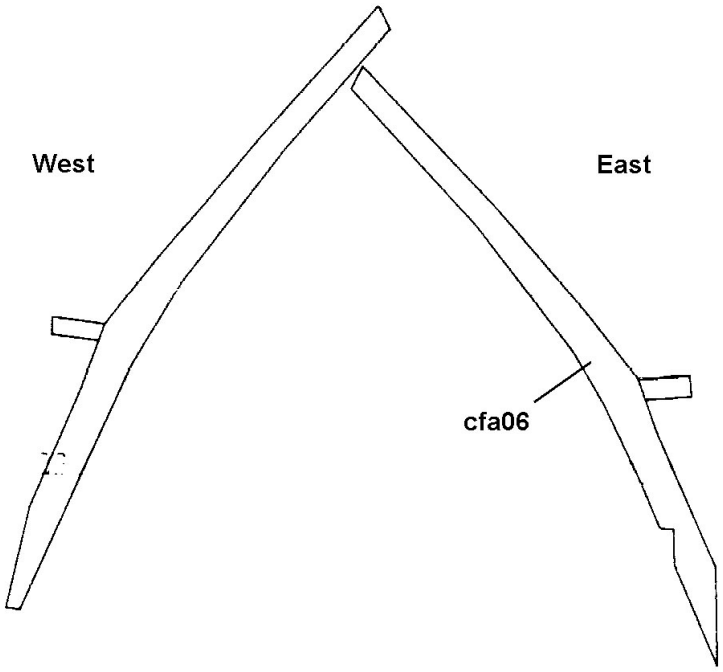

Figure 4: Cruck E, showing the approximate position of the sample removed for dendrochronology

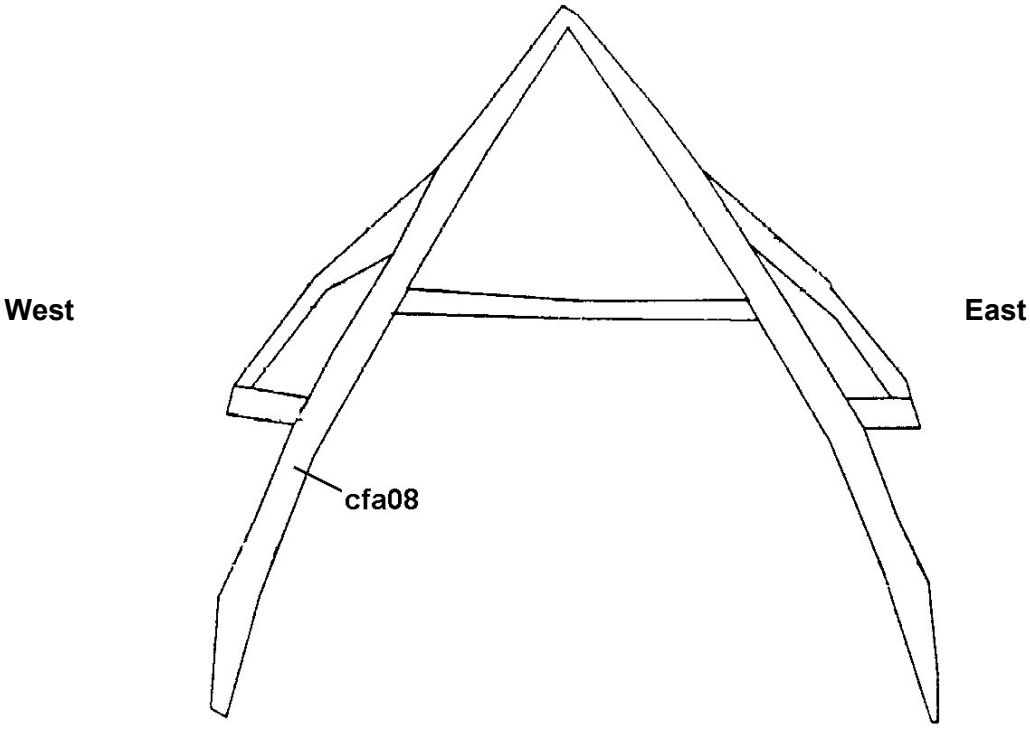

Figure 5: Cruck D, showing the approximate position of the sample removed for dendrochronology

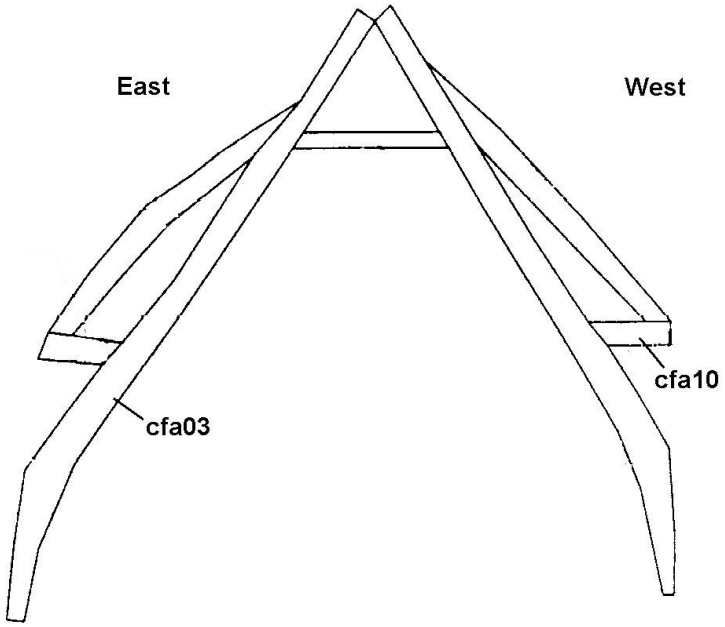

Figure 6: Cruck C, showing the approximate positions of the samples removed for dendrochronology

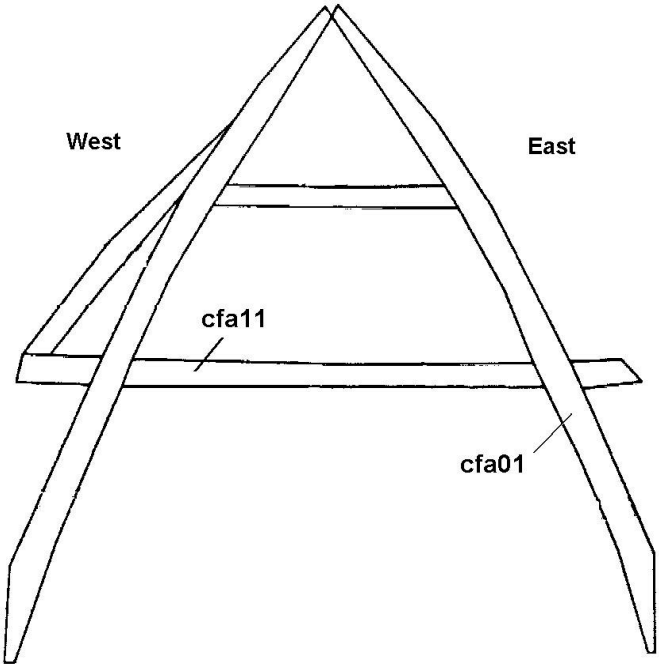

Figure 7: Cruck B, showing the approximate positions of the samples removed for dendrochronology

Results and Interpretation

All timbers sampled were of oak (*Quercus* spp.). Details of the samples are given in Table 1 and their approximate positions are illustrated in Figures 2–7. Cross-matching between nine samples is shown in Table 2; that for cfa08 and cfa09 was confirmed by individual comparison with reference data. Sample cfa04 at only 43 years represents one of those samples that might not usually be analysed as it is such a short sequence, but with the good replication of samples here it can be seen to match well and be a useful additional dated sample. Three longer series, cfa05, cfa06, and cfa11, failed to give matches that were considered acceptable, and these remain undated. Consequently the nine matched series were combined to make a 128-year site chronology, **AYLTON**, which was subsequently dated to the period AD 1375–1502, the best matches being given in Table 3. The relative positions of overlap of the dated samples are illustrated in Figure 8, along with their interpreted likely felling date ranges.

Two timbers retained complete sapwood, both having been felled in winter AD 1502/3. The other dated samples appear to form a single group with similar felling dates, and it seems likely therefore that the barn was constructed in AD 1503, or within a year or two thereafter. This makes it an early sixteenth-century barn, as opposed to the fourteenth- or fifteenth-century date expected.

One interesting feature noted during the fieldwork was the presence of battens attached to the structural timbers to which the external weatherboarding was attached in panels (Figs 9a and b), rather than the more modern system of nailing boards across the timbers. This was noted earlier at Priory Barn, Little Wymondley, Hertfordshire, previously the earliest dated example of this style (trees felled winter AD 1540/41) (Bridge 2001).

Acknowledgements

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Table 1: Details of oak (*Quercus* spp.) timbers sampled from Court Farm Barn, Aylton, Herefordshire

Sample Number	Timber and position	No of rings	Mean width (mm)	Mean sens (mm)	Dates AD Spanning	H/S bdry AD	Sapwood complement	Felling seasons and dates/date ranges (AD)
cfa01	Cruck B east	55*	0.63	0.19	1448–1502	1473	29C	Winter 1502/3
cfa02	Post B east	105	1.18	0.20	1388–1492	1478	14+*2*	1495–1519
cfa03	Cruck C east	56	3.11	0.19	1438–93	1482	11+*2*	1496–1523
cfa04	Curved brace, east wall, bay E-F	43	2.44	0.29	1443–85	1485	h/s	1496–1526
cfa05	Post F east	76+*10*	2.26	0.17	undated	-	-	unknown
cfa06	Cruck E east	80	2.84	0.25	undated	-	h/s	unknown
cfa07	Wallplate, bay D-E west	94	1.29	0.18	1409–1502	1481	21C	Winter 1502/3
cfa08	Cruck D west	58	2.31	0.25	1420–77	1477	h/s	1488–1518
cfa09	Wallplate, bay B-C west	84	1.08	0.22	1375–1458	-	-	after 1469
cfa10	Cruck spur C west	118	1.13	0.19	1380–1497	1477	20	1498–1518
cfa11	Girding beam, truss B	75	1.94	0.20	undated	-	12	unknown
cfa12	Intermediate post, bay A-B west	58	1.48	0.19	1424–1481	1481	h/s	1492–1522

* only the outer 55 rings were measured, as bands of narrow rings made individual rings impossible to distinguish on the inner core
Sapwood estimate 11–41 rings. Rings in *italics* were not measured.

Table 2: Cross-matching between samples from the barn

	t-values							
SAMPLE	**cfa02**	**cfa03**	**cfa04**	**cfa07**	**cfa08**	**cfa09**	**cfa10**	**cfa12**
cfa01	7.8	-	4.6	4.0	-	\	-	3.8
cfa02		4.1	5.3	5.9	3.3	3.8	4.1	4.3
cfa03			5.3	3.5	-	-	3.7	3.8
cfa04				3.0	-	\	-	3.8
cfa07					-	-	4.8	3.1
cfa08						-	3.2	8.6
cfa09							4.4	3.5
cfa10								3.7

- = *t*-value less than 3.0

\ = overlap less than 20 years, no *t*-value calculated

Table 3: Dating evidence for the site chronology **AYLTON,** AD 1375–1502 (regional multi-site chronologies have the file name in **bold**)

County/ region:	***Chronology name:***	***Short publication reference:***	***File name:***	***Spanning: (yrs AD)***	***Overlap (yrs)***	***t-value***
Herefordshire	Cradley Village Hall	(Miles *et al* 2004)	CRADLEY	1347–1530	128	10.5
Gloucestershire	Mercer's Hall, Gloucester	(Howard *et al* 1996)	GLOUCMH	1289–1541	128	9.6
Herefordshire	Lower Brockhampton Gatehouse	(Nayling 2001)	LBG-T10	1368–1543	128	9.3
Worcestershire	Church House, Areley Kings	(Miles *et al* 2003)	ARELEY	1365–1535	128	9.1
Wales	Welsh Master Chronology	(Miles 1997b)	**WALES97**	404–1981	128	9.0
Gloucestershire	Westgate St, Gloucester	(Tyers and Wilson 2000)	WGATE1	1209–1518	128	8.6
Shropshire	Shropshire Master Chronology	(Miles 1995)	**SALOP95**	881–1745	128	8.6
Herefordshire	Broad Street, Leominster	(Miles 2001)	LEOMSTR2	1349–1499	125	8.5
Herefordshire	Cathedral Barn, Hereford	(Tyers 1996)	HERECB2	1359–1491	117	8.5
Herefordshire	Booth Hall, Hereford	(Boswijk and Tyers 1997)	HIGHTOWN	1302–1487	115	8.4

§ = component of SALOP95 regional chronology

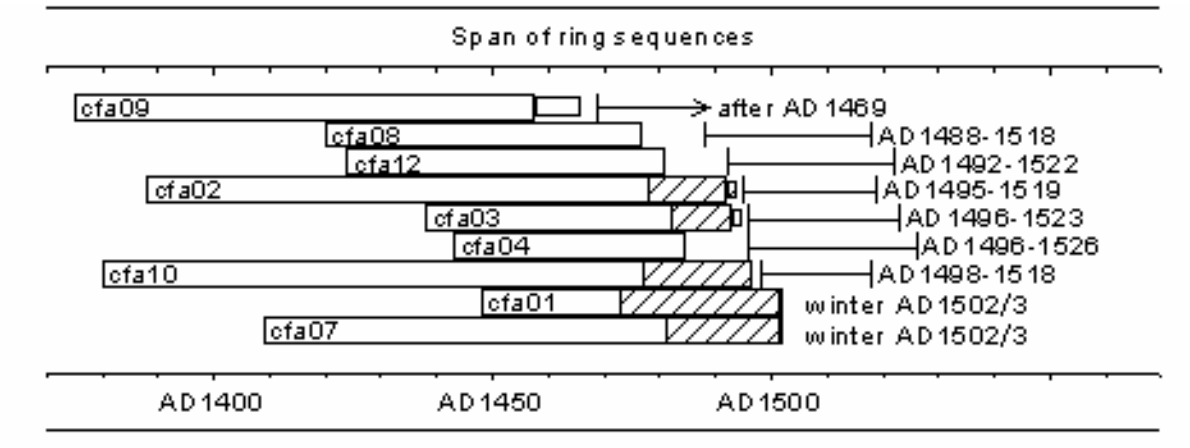

Figure 8: Bar diagram showing the relative positions of overlap of the dated timbers from the barn at Court Farm, Aylton, Herefordshire, along with their interpreted felling dates. Narrower bar sections represent additional unmeasured rings, and hatched sections represent sapwood rings

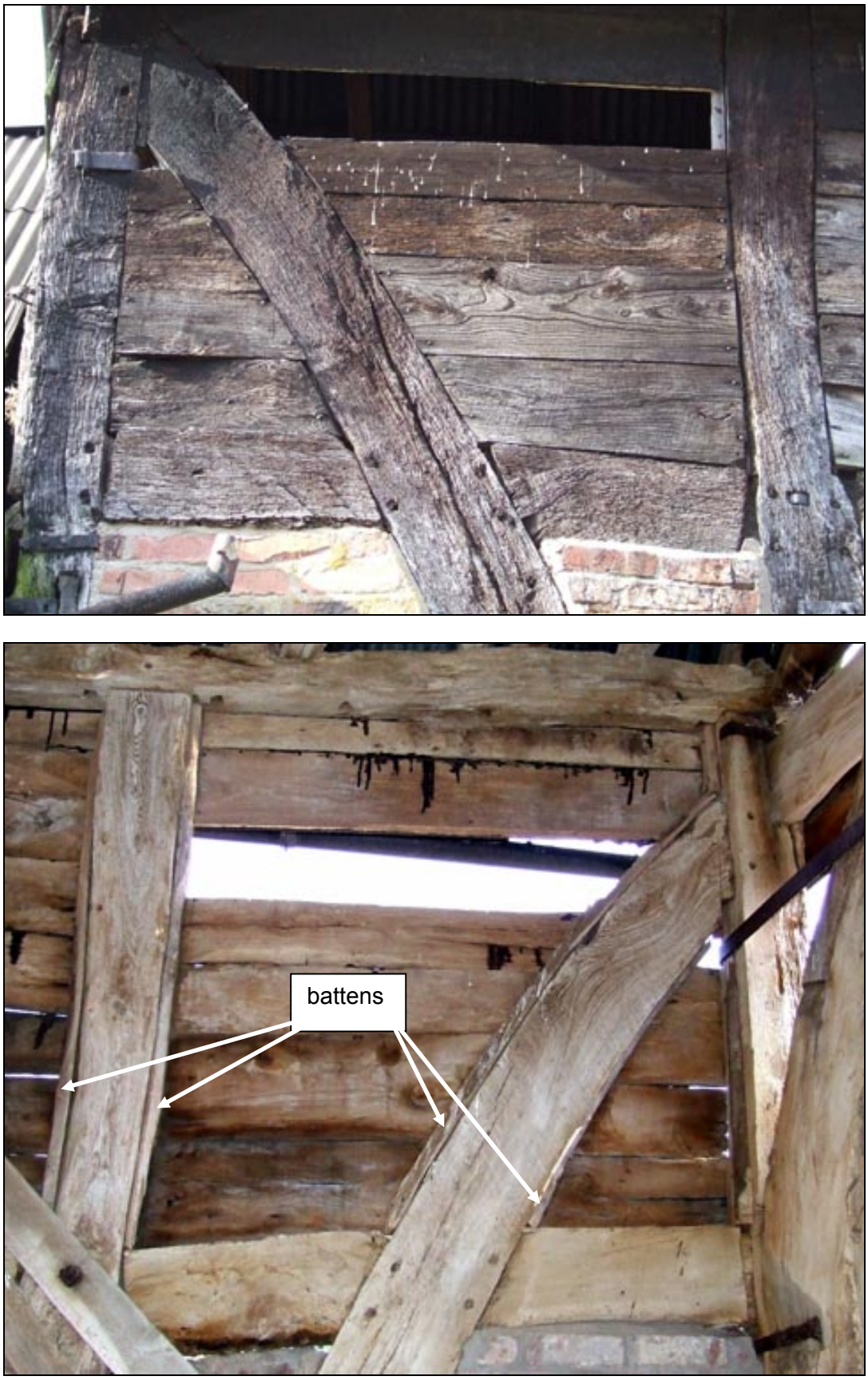

Figure 9a and b: External and internal views of the weatherboarding at the south end of the east wall

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