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Summary

Dendrochronological analysis of oak timbers from Lancin Farmhouse, Wambrook, Somerset, has resulted in the production of a precise felling date of AD 1533/4 for some timbers from a later roof phase. The quality of the timbers used for most of the earlier phases prevented successful analysis. A number of observations are made concerning the use of unusual species of timbers for some elements of the structure.

Author's address :-

Ian Tyers

Sheffield Dendrochronology Laboratory
Archaeology & Archaeological Science Research School
Department of Archaeology & Prehistory
University of Sheffield
Sheffield
S10 2TN

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Introduction

The purpose of the study was to carry out dendrochronological analyses of a variety of elements within the building in order to assist the interpretation of the complex sequence of alterations identified within it. The initial approach, from Rebecca Child, the English Heritage Historic Buildings Architect for Somerset, was timed to coincide with a planned major programme of repair and restoration to the building. The timbers were sampled during the restoration programme at a stage when the maximum number of the important structural elements were as fully exposed as possible.

Lancin Farmhouse, Wambrook, Somerset (NGR ST285079), has been planned and recorded by John Dallimore, and others, from the Somerset and South Avon Vernacular Building Research Group (Figure 1). The following notes utilise descriptions and phasing from a report by John Dallimore (1994). The individual timber and phase numbers used throughout this report are derived from his.

The house is thought originally to have been an open hall house of cruck construction throughout, the walls being partly of cob and partly of rubble stone. The roof may have been half-hipped. The surviving parts of this phase (Phase I) consist of two crucks and two doorways; the provisional date for this phase, that is prior to this dendrochronological analysis, is mid-fifteenth-century. Phase II, provisionally dated to the late-fifteenth-century, involved the creation of an inner room by the insertion of a partition with doorway and the insertion of a chamber floor. Phase III, provisionally dated to the early-sixteenth-century, involved a re-roofing of the Low End incorporating a jointed cruck truss and a smoke-hood, and the removal of the cross-passage/hall partition. Phase IV, possibly mid-sixteenth-century, involved the insertion of two ceilings and two doors, the re-use of elements from the partition removed in Phase III, and possibly a first floor partition. The possibly early-seventeenth-century Phase V involved substantial upgrading and extension using new stacks and fireplaces, raising of walls, insertion of new staircases, partitions and doors. Phase VI, possibly dating from the late-seventeenth-century, involved the insertion of new fireplaces, stacks, oven, and stairs and the re-alignment of the south wall.

The original request was for sampling from three main phases: the Phase I crucks, the Phase III jointed cruck, and the Phase IV inserted floors. The building was briefly visited to assess its suitability for dendrochronological analysis prior to any restoration work being undertaken.

This assessment indicated that the building did contain some timbers suitable for analysis, although difficulties of access and exigencies of time prevented all prioritised timbers from being examined in detail.

Methodology

All accessible timbers were assessed for suitability. Unsuitable samples are usually those with unclear ring sequences or fewer than 50 rings, or timbers from non-oak trees (at least for the provision of routine dates). The oak (*Quercus* spp) timbers that looked most suitable, and could be sampled both without major disfigurement and without affecting their structural integrity, were selected for sampling and study. Cores were taken using a 15mm diameter hollow borer attached to an electric drill. Each core was polished using sand paper of a number of grades until the boundaries of the annual growth rings were clearly defined. In addition a number of elements were removed during restoration. These timbers were sampled by removal of a cross-sectional slice at a position to either maximise the number of rings or to retain the best surviving evidence of sapwood and bark-edge. One timber that was suitable for analysis could not be cored and was instead directly measured *in situ* where the end-grain was exposed.

The complete sequence of growth rings in the samples that were selected for dating purposes were measured to an accuracy of 0.01mm using a micro-computer based travelling stage. The ring sequences were plotted onto semi-log graph paper to enable visual comparisons to be made between sequences. In addition cross-correlation algorithms (Baillie and Pilcher 1973; Munro 1984) were employed to search for positions where the ring sequences were highly correlated. These positions were checked using the graphs and, where these were satisfactory, new mean sequences were constructed from the synchronised sequences. The *t*-values reported below are derived from the original CROS algorithm (Baillie and Pilcher 1973). A *t*-value of 3.5 or over is usually indicative of a good match, although this is with the proviso that high *t*-values at the same relative or absolute position must be obtained from a range of independent sequences, and that these positions are supported by satisfactory visual matching.

All the measured sequences from this building were compared with each other and those that were found to cross-match were combined to form a site master curve. This master curve and the remaining unmatched ring sequences were then tested against a range of reference chronologies, using the same matching criteria: high *t*-values, replicated values against a range of chronologies at the same position, and satisfactory visual matching. Where such positions are found these provide calendar dates for the ring-sequence.

These tree-ring dates can initially only date the rings present in the timber. Their interpretation relies upon the nature of the final rings in the sequence. If the sample ends in the heartwood of

the original tree, a *terminus post quem (tpq)* for the felling of the tree is indicated by the date of the last ring plus the addition of the minimum expected number of sapwood rings that may be missing. This *tpq* may be many decades prior to the real felling date. Where some of the outer sapwood or the heartwood/sapwood boundary survives on the sample, a felling date range can be calculated using the maximum and minimum number of sapwood rings likely to have been present. Alternatively, if bark-edge survives, then a felling date can be directly utilised from the date of the last surviving ring. The sapwood estimates applied through-out this report are a minimum of 10 and maximum of 55 annual rings, where these figures indicate the 95% confidence limits of the range. These figures are applicable to oaks from the British Isles (Hillam *et al* 1987). The dates obtained by the technique do not by themselves necessarily indicate the date of the structure from which they are derived. It is necessary to incorporate other specialist evidence concerning the re-use of timbers and the repairs of structures before the dendrochronological dates given here can be reliably interpreted as reflecting the construction date of phases within the building.

Results

The majority of the timbers proved to be unsuitable for the technique due primarily to the lack of rings present in the timbers, for example the purlins and crucks and the screen Pt1. There were also several timbers that could not be sampled because of aesthetic and structural considerations, for example the D5 screen. As a result only two cores were attempted, one of which when completed was found to have too few rings. However the Phase III flat rafters were being extensively modified and it was possible to obtain several complete cross-sections from this material. A window lintel was also being entirely replaced and this was sampled by obtaining a complete cross-sectional slice. In addition the ground floor fireplace lintel (F2 lintel) could be cleaned and measured *in situ* where the end-grain was exposed without the necessity of sampling. Lastly two samples were obtained from the cruck C2 for species identification since these were recognised on site as being made of timber other than oak. A total of nine samples were therefore obtained from the building (Table 1). Copies of the draft phase plans were annotated with sampling positions for use in the final synthesis and report.

The three samples from the Phase III roof, consisting of two rafters and a secondary purlin, were matched to produce a short but replicated sequence. The quality of matches between these samples indicates they are all derived from the same tree (Table 2) and all were complete to the bark-edge (Figure 2). This single tree sequence was found to date to an extensive range of chronologies (Table 3), and indicates felling of the parent tree in winter-AD 1533/summer-AD 1534. One other sample, the direct measurement set from the fireplace lintel (F2 lintel), was found to give good matching results indicating the last ring present on the beam was AD 1493. The sequence consists entirely of heartwood and by adding the minimum expected number of

lost sapwood rings a felling is suggested some time after AD 1503. The two remaining measured samples have failed to produce acceptable dates and are thus undated by the technique. The site master chronology LANCIN, dating from AD 1374-1533 inclusive is listed in Table 4.

The fragments from each blade of cruck C2 were identified as ash (*Fraxinus* sp).

Interpretation

The bark-edge present on the rafters and secondary purlins clearly indicates the presence of several timbers, all derived from a single tree, in the East roof area that were felled AD 1533/4. These radially split timbers had no apparent signs of re-use and it is likely that these reliably reflect the re-construction of this end, currently interpreted as part of Phase III.

The interpretation of the date obtained for the F2 lintel sequence is less useful. This fireplace is currently interpreted as being part of the Phase III modifications. The tree-ring date of 'later than AD 1503' is clearly compatible with this interpretation. Two additional factors support this hypothesis. First, the large size of the parent tree necessary to produce such a beam raises the likelihood that as much of it as possible was utilised for the beam and thus the original outer edge of the tree is not far from the extreme corners currently present on the timber. Second, contemporaneous sampling notes indicate the likely presence of the heartwood/sapwood boundary elsewhere on the beam and this may also be used to indicate felling between *c* AD 1503 and *c* AD 1550. It must be noted that such interpretations are not infallible. The inner edge of fireplace lintels are often burnt and such surfaces frequently look like heartwood/sapwood interfaces even when they are not, and there may be some other reason why an overlarge tree was utilised in this position. However, the best available evidence supports its present interpretation as part of Phase III.

Somewhat disappointingly this analysis has obtained no useful chronological results for any other phase within the building. The rest of the oak timbers contain too few rings for dendrochronological techniques to be reliably applied. This is a common problem with medieval and later buildings in several parts of the country. Devon, Cornwall, and the East Anglia region in particular tend to have buildings made using young, fast grown oaks that cannot be reliably dated. The rafter/secondary purlin group from Lancin are somewhat different, being radially split material from a larger tree. This perhaps indicates that a different type of woodland area or that different economic considerations applied during this re-modelling.

Discussion

The very tight date obtained for one phase of this building should allow both greater confidence in the rest of the provisional phasing of the structure and provides a fixed point to initiate documentary searches and comparative studies of notable features of the structure. The production of a tree-ring chronology from a relatively humble building is clearly of wider use to the dendrochronological objective of creating good quality regional tree-ring sequences for different parts of the country. The close Devon/Somerset border means the LANCIN chronology may be of value for the forthcoming Devon buildings project which is aimed at producing sub-regional sequences for the County.

Perhaps of equal significance were the observations made concerning timber species utilisation within the structure. The Phase I ash blades of cruck C2 are apparently coeval with the oak blades of cruck C3. The later jointed cruck JC1 is also oak. Such intermixing of species perhaps indicates either a lack of concern about the differing qualities of timber types or the difficulties of obtaining suitably sized or curved oaks for the production of the crucks. Comparative data is hard to obtain, particularly since the national cruck catalogue (Alcock 1981) fails to address species utilisation for cruck construction. Whilst it is true that most medieval building timbers that survive to the present day are oak, this was not necessarily so in the past due to the poorer durability of non-oak timbers. This must have resulted in an over-representation of oak in surviving buildings. There has been no detailed research into the utilisation of non-oaks for structural timbers, particularly since there is the problem that species identification is not easy in the field. Hence, without access to appropriate specialists, the majority of building surveys have hitherto concentrated upon structural aspects. There are records of the use of poplar (*Populus* spp) for crucks in Hereford and Worcester (Harris 1974), Devon (CM Groves pers comm 1994) and Hampshire (DH Miles pers comm 1994). Elm (*Ulmus* spp) cruck blades are known from Buckinghamshire, Oxfordshire, Warwickshire, and elsewhere (DH Miles pers comm 1994). Although there is no national database of such information, the presence of ash in a cruck frame appears to be a unique finding. The difficulty of proving this points to a major lacuna in the present records for standing buildings.

Conclusion

The dendrochronological analysis of timbers from Lancin produced evidence for trees felled in AD 1533/4 being utilised in the modifications of the roof, currently ascribed to Phase III of the development of the building. A fireplace lintel may be part of the same phase. A tree-ring chronology dated AD 1374-1533 inclusive was produced from the building. The possibly unique evidence for the use of ash timbers for an early cruck frame was noted.

Acknowledgements

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Figure 1 Plans and sections of Lancin Farmhouse

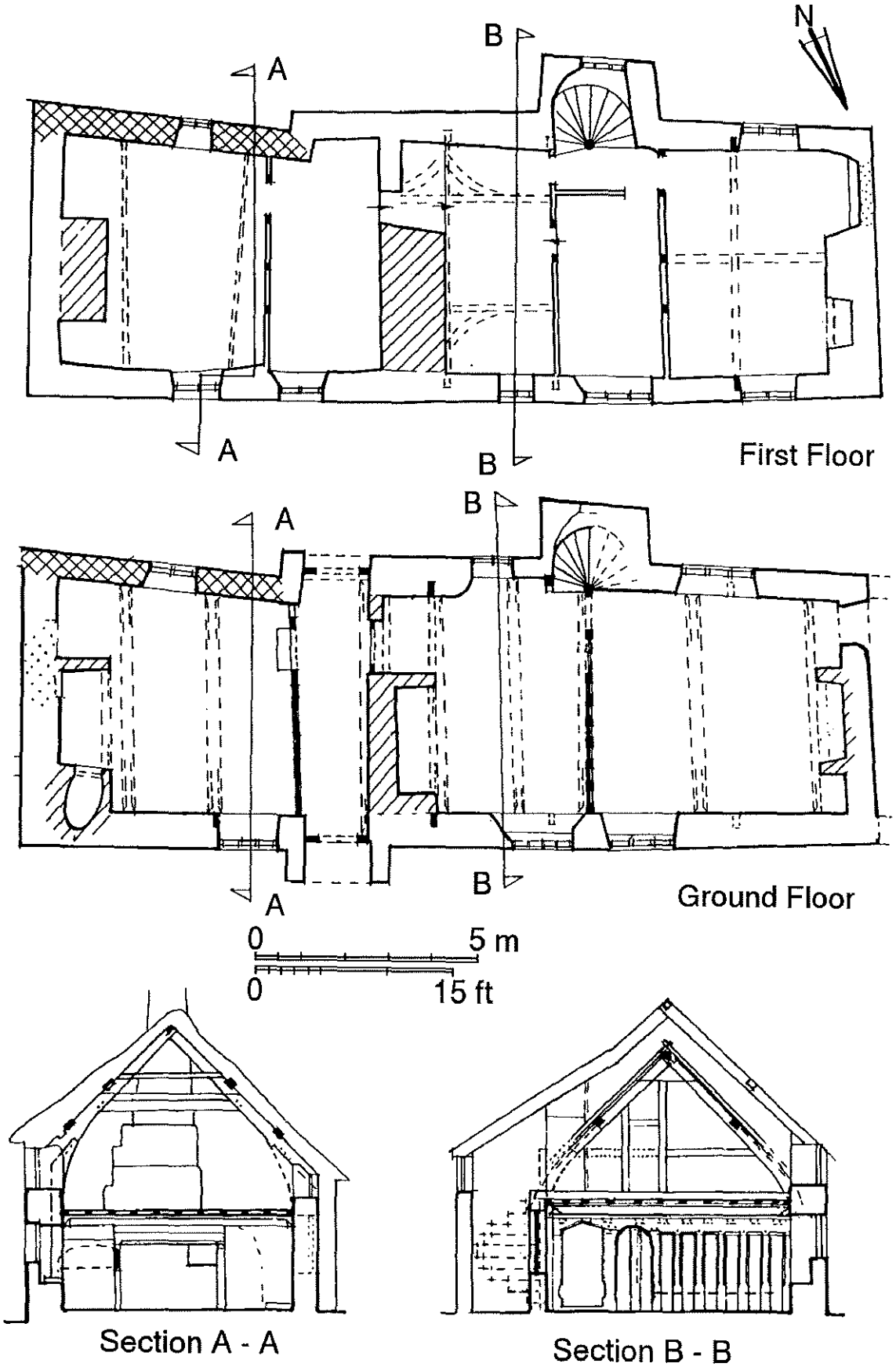


Figure 2. Bar diagram showing the relative positions of the dated ring sequences from Lancin Farmhouse.

White bars - heartwood rings; shaded bars - sapwood rings; B - bark-edge

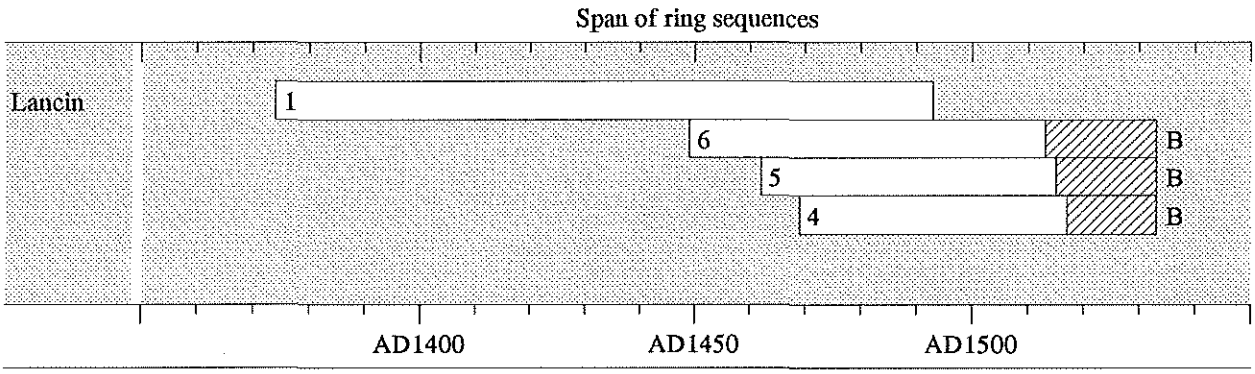


Table 1 Summary details of samples

Sitename : **Lancin Farmhouse, Wambrook**

County : **Somerset**

Gridref : **ST285079**

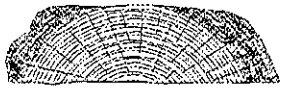
Sample number	Description	Sample type	Species	No of rings	Number of sapwood rings	bark edge	Dimensions (mm)	Growth-rate (mm/year)	Result	Date of Sequence	Cross-section (not to scale)
1	F2 Fireplace Lintel	in situ	*Quercus*	120	0	no	465 x 325	3.2	dated	AD 1374-1493	
2	Ground Floor Ceiling Beam	core	*Quercus*	90	0	no	330 x 260	3.2	undated		
3	Ground Floor Screen top Beam	core	*Quercus*	41	0	no	320 x 150	3.2	unmeasured		
4	SE Rafter 1 same tree as 5/6	slice	*Quercus*	65	16	yes	160 x 50	2.5	dated	AD 1469-1533	
5	SE Rafter 4 same tree as 4/6	slice	*Quercus*	72	18	yes	155 x 60	2.1	dated	AD 1462-1533	
6	SW Purlin same tree as 4/5	slice	*Quercus*	85	20	yes	190 x 60	2.2	dated	AD 1449-1533	
7	N Window Lintel (2 slices)	slice	*Quercus*	74	27	?yes	360 x 100	1.7	undated		
8	SE blade Cruck C2	identification	*Fraxinus*						identified		
9	SW blade Cruck C2	identification	*Fraxinus*						identified		

Table 2

Correlation between material derived from a single tree.

	t-values	
sample	**samples**	
	5	*6*
4	7.79	6.60
5		14.05

Table 3

Dating of the master curves from Lancin Farmhouse, Wambrook, AD 1374-1533. *t*-values with dated reference chronologies. All the reference curves are independent.

	t-values		
	sample numbers		
Reference chronology	*4/5/6*	*1*	*1+ 4/5/6*
London mean (Sheffield Dendro Lab unpubd)	5.3	4.3	6.6
Brookgate (see Miles and Haddon-Reece 1993)	6.2	5.7	8.1
Frocester (see Fletcher *et al* 1985)	4.0	3.7	5.3
Welsh border (Siebenlist-Kerner 1978)	5.3	5.2	6.6
Hafoty 1 (see Hillam and Groves 1992)	4.9	4.5	6.0
Exeter mean (Sheffield Dendro Lab unpubd)	7.5	5.1	7.1
Thaxted Church (see Tyers 1990)	4.0	3.8	5.5

Table 4

Ring-width data of the site master curve for oaks from the Lancin Farmhouse, AD 1374-1533.

year	ring widths (0.01mm).										number of trees per year									
AD 1374				177	177	143	106	227	327	218				1	1	1	1	1	1	1
	240	221	320	259	394	466	439	454	428	399	1	1	1	1	1	1	1	1	1	1
	426	382	463	367	397	581	452	600	510	479	1	1	1	1	1	1	1	1	1	1
AD 1401	535	439	566	508	470	545	491	497	485	434	1	1	1	1	1	1	1	1	1	1
	356	385	366	500	399	378	560	476	301	495	1	1	1	1	1	1	1	1	1	1
	354	292	553	640	540	535	409	365	269	339	1	1	1	1	1	1	1	1	1	1
	379	382	313	298	355	383	311	308	158	188	1	1	1	1	1	1	1	1	1	1
	170	191	312	271	256	261	291	306	256	325	1	1	1	1	1	1	1	1	2	2
AD 1451	255	204	209	291	228	250	283	259	221	289	2	2	2	2	2	2	2	2	2	2
	238	216	280	187	216	329	311	325	251	249	2	3	3	3	3	3	3	3	4	4
	242	266	244	273	322	237	221	213	193	222	4	4	4	4	4	4	4	4	4	4
	216	193	215	221	250	255	235	200	192	199	4	4	4	4	4	4	4	4	4	4
	231	194	228	188	167	245	233	175	205	202	4	4	4	3	3	3	3	3	3	3
AD 1501	166	207	234	269	219	210	166	176	211	177	3	3	3	3	3	3	3	3	3	3
	190	235	212	214	188	161	164	217	276	211	3	3	3	3	3	3	3	3	3	3
	292	332	180	197	181	259	196	220	184	175	3	3	3	3	3	3	3	3	3	3
	209	208	191								3	3	3							