

Centre for Archaeology Report 82/2001

**Tree-Ring Analysis of Timbers from the Ancient House, Church
Lane, Walthamstow, London Borough of Waltham Forest**

Dr Martin Bridge

© English Heritage 2001

ISSN 1473-9224

The Centre for Archaeology Reports Series incorporates the former Ancient Monuments Laboratory Report Series. Copies of Ancient Monuments Laboratory Reports will continue to be available from the Centre for Archaeology (see back of cover for details).

Tree-Ring Analysis of Timbers from the Ancient House, Church Lane, Walthamstow, London Borough of Waltham Forest

Dr Martin Bridge

Summary

This house was originally a hall house with an octagonal crown-post roof, but now has an inserted floor in the hall. The two-storey jettied crosswings to east and west are also medieval, though their date of construction was unknown. The property was converted into several separate dwellings at a much later date, but recent renovation work has exposed the whole frame. Most timbers were found to be fast-grown oak with too few rings to date dendrochronologically, and some were found to be of elm. Two short sequences from the west wing dated, giving an estimated felling date range of AD 1564-92 based on a single timber with sapwood. A third timber in this range, demonstrably different in the age and slow growth of its parent tree, gave a likely felling date range of AD 1477-1509.

Keywords

Dendrochronology
Standing Building

Author's address

Institute of Archaeology, University College London, 31-34 Gordon Square, London WC1H 0PY. Tel 020 7679 1540. Email: martin.bridge@ucl.ac.uk

Many CfA reports are interim reports which make available the results of specialist investigations in advance of full publication. They are not subject to external refereeing, and their conclusions may sometimes have to be modified in the light of archaeological information that was not available at the time of the investigation. Readers are therefore advised to consult the author before citing the report in any publication and to consult the final excavation report when available.

Opinions expressed in CfA reports are those of the author and are not necessarily those of English Heritage.

Introduction

The Ancient House in Walthamstow (NGR TQ 3786 8916; Fig 1) is a former hall house which has a floor inserted in the hall. The two-storeyed and jettied crosswings, along with the hall were restored in AD 1934 and continued in use divided into four dwellings. In early AD 2001 the whole frame of the hall and west wings were exposed during major renovation works. Dendrochronological dating of the hall, and the east and west ranges was commissioned by English Heritage in order to inform the Listed Building Consent.

The architect suggested four phases of work were present. The earliest phase was the two-bay hall, thought to be fifteenth-century. The east wing was thought to be possibly contemporaneous, but showed signs of having been extensively rebuilt. There is some dispute as to whether the west wing is mostly rebuilt, there are certainly signs of some timbers having been replaced, and little of the earliest roof structure survives (Wittrick, pers comm). Stylistically the west wing looks to be late-sixteenth to early-seventeenth century and may be coeval with the insertion of the floor into the hall.

Methodology

The site was visited in February AD 2001. The timbers were assessed for their potential use in dendrochronological study. Oak timbers with more than 50 rings, traces of sapwood, and accessibility were the main considerations in the initial assessment. Those 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. Sometimes cores have less than 50 rings when extracted; those with over 40 rings are analysed. A slice from the inserted floor beam in the hall section was supplied on site.

The cores and slice 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 utilizing a binocular microscope with the sample mounted on a travelling stage with a linear transducer linked to a PC. The software used in measuring and subsequent analysis was written by Ian Tyers (1999).

Ring sequences were plotted to allow visual comparisons to be made between sequences on a light table. This activity also acts as a measure of quality control in identifying any errors in the measurements when the samples crossmatch. Statistical comparisons were made using Student's *t*-test (Baillie and Pilcher 1973; Munro 1984). The *t*-values quoted below were derived from the original CROS program (Baillie and Pilcher 1973). Those *t*-values in excess of 3.5 are taken to be indicative of acceptable matching positions provided that they are supported by satisfactory visual matches, and give consistent matching positions.

When crossmatching between samples is found, their ring-width sequences are meant 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, which 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.



Figure 1: Map to show the general location of the Ancient House, Church Lane, Walthamstow



Figure 2: Drawing of the south elevation of the west wing showing the approximate locations of samples taken for dendrochronology (adapted from an original by Butler and Heggarty, Architects)

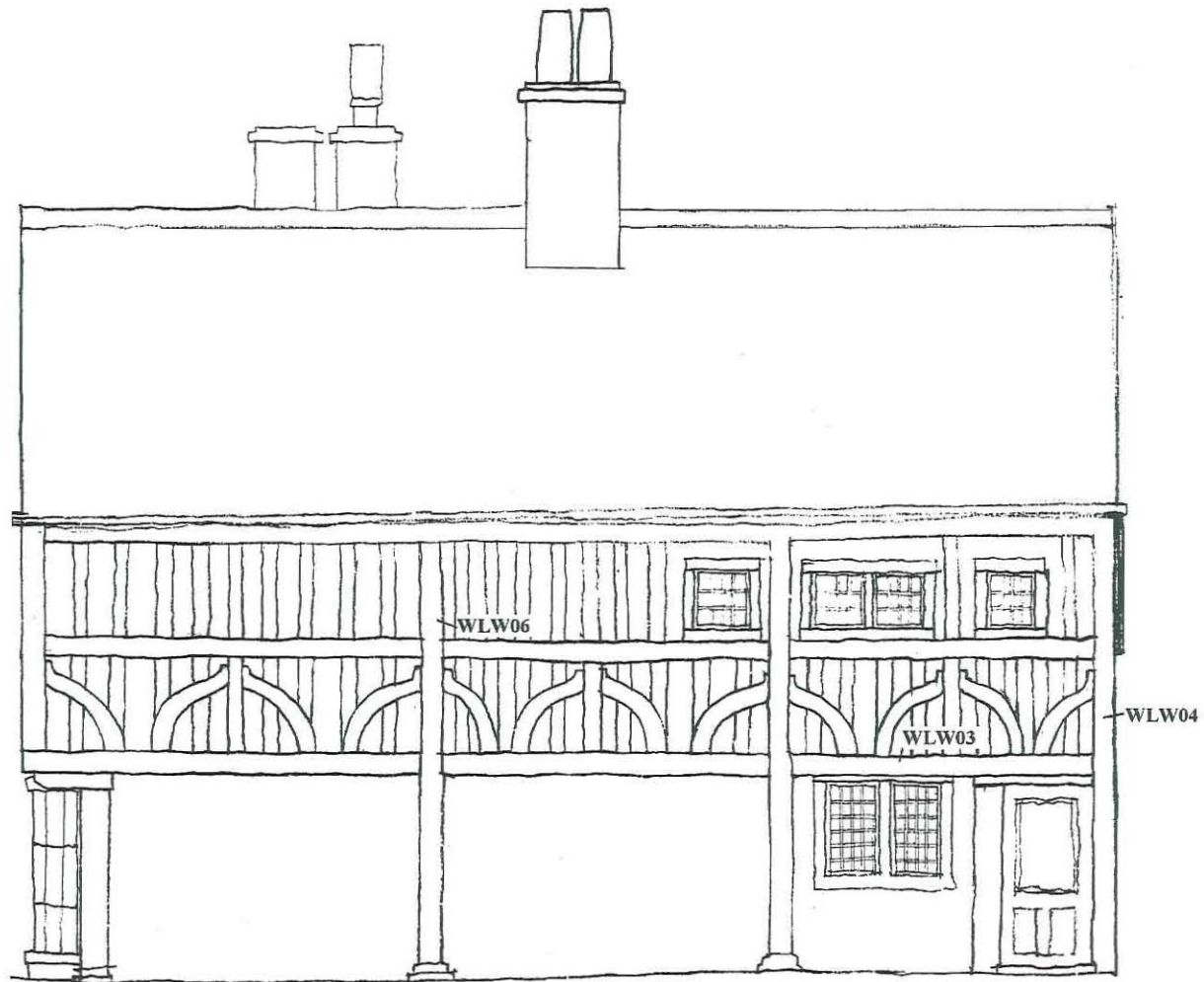


Figure 3: Drawing of the west elevation of the west wing, showing the approximate locations of samples taken for dendrochronology (adapted from an original by Butler and Heggarty, Architects)

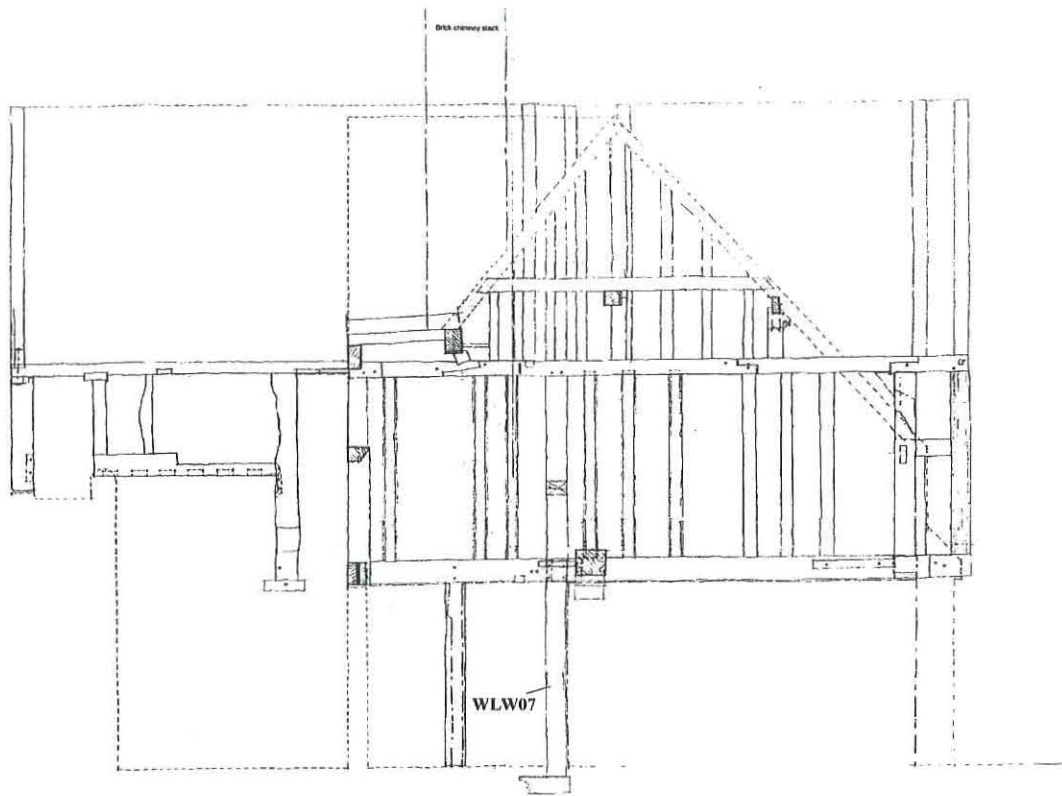


Figure 4: Drawing of the east wall of the west wing, showing the location of sample WLW07 (adapted from an original by Butler and Heggarty, Architects)

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 rings available on each sample. Interpretation of these dates then has to be undertaken to relate these findings to the construction date of the phase under investigation. An important aspect of this interpretation is the estimate of the number of sapwood rings missing. In this instance, the sapwood estimates are based on those proposed for this area by Miles (1997), in which 95% of samples are likely to have from 9 to 41 sapwood rings. Where bark is present on the sample the exact date of felling of the tree used 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 re-use of timbers, construction in most historical periods took place within a very few years after felling (Salzman 1952; Hollstein 1965).

Results

Inspection of the timbers of the east wing and hall sections revealed that the timbers were fast-grown oak (*Quercus* sp.) with too few rings for dendrochronological study. A number of *ex situ* timbers were similarly discarded from further analysis. A slice from the main beam of the inserted floor in the hall was supplied on site.

In the west wing, the floor joists and part of the rail in the first-floor west wall were found to be of elm (*Ulmus* sp.) and some of the oak timbers looked more promising than in other parts of the building. Samples were taken from a number of timbers (Figs 2, 3, and 4). The locations of samples and other information relating to them are given in Table 1.

Sample WLW05 (90 years) had the narrowest average ring-width of all the samples (1.2 mm) and showed a trend of increasing ring-width throughout its life, the opposite of what is usually found in ageing trees. It gave consistent crossmatching at a position corresponding to the date of the outer ring being AD 1472 (Table 2). The data for this sample are given in Table 4.

Samples WLW03 and 06 showed bands of narrow rings in the mid-section of their sequences, as did the sequence from the slice from the inserted floor beam (WLW09), which may account for their failure to date.

Two of the short sequences (WLW04 and WLW07) gave strong consistent matches with a range of regional and site chronologies (Table 3). Although their overlap with each other was very short ($t = 3.1$ with only 28 rings of overlap), they were from the same area of the frame, and their sequences were combined to form a site master WALTHAMSTOW which was also dated independently (Table 3). The relative overlap of these samples and their interpreted felling dates are shown in Figure 5. The data for this chronology are given in Table 5.

Interpretation and Discussion

Most of the timbers in the structure were rejected as unsuitable for sampling because they contained so few rings. It was very surprising that the three sequences which dated

Table 1: Oak (*Quercus* spp.) timbers sampled from the Ancient House, Walthamstow. h/s = heartwood-sapwood boundary

Sample number	Origin of core/slice	Total no of years	Average growth rate (mm yr ⁻¹)	Sapwood details	Date of sequence AD	Felling date of timber AD
West wing						
WLW01	South wall, east stud	<40	unmeasured	-	undated	unknown
WLW02	South-east corner post	<40	unmeasured	-	undated	unknown
WLW03	South wall, west stud	64	2.3	13	undated	unknown
WLW04	South-west corner post	44	3.2	13	1521-64	1564-92
WLW05	West wall, rail in south bay	90	1.2	4	1383 - 1472	1477 - 1509
WLW06	West wall, post towards north end	56	3.9	-	undated	unknown
WLW07	East wall, jewelled post by door	48	2.9	-	1501-1548	after 1557
WLW08	South floor beam	<40	unmeasured	-	undated	unknown
Hall						
WLW09	Slice from main beam in inserted floor	59	4.3	10	undated	unknown

Table 2: Dating of the oak sample WLW05

Dated reference or site master chronology	WLW05	
	<i>t</i> -value	Overlap (yrs)
Southern England (Bridge 1988)	3.9	90
Hants97 (Miles pers comm)	3.9	90
Medbourne, Leicestershire (Howard <i>et al</i> 1999)	6.1	75
Leominster, Herefordshire (Miles and Worthington 1997)	5.3	90
CB2-Hereford, Herefordshire (Tyers 1996)	5.1	90
Stanford, Northamptonshire (Howard <i>et al</i> 1996)	5.1	90
BadgeCt, Worcestershire (Bridge 2001)	5.0	54
Thaxted, Essex (Tyers 1990)	4.8	90
Cranfield, Bedfordshire (Bridge 1998a)	4.7	87
Compton Bassett, Wiltshire (Miles 2001)	4.5	72
Widdington, Essex (Tyers 2001)	4.4	90

Table 3: Dating evidence for samples WLW04 and WLW07, along with the site master WALTHAMSTOW. A (-) indicates no significant crossmatch at the date given

Dated reference or site master chronology	WLW04 AD 1521-64		WLW07 AD 1501-48		WALTHAMSTOW AD 1501-64	
	<i>t</i> -value	Overlap (yrs)	<i>t</i> -value	Overlap (yrs)	<i>t</i> -value	Overlap (yrs)
Feb2000 (Bridge 2000)	7.1	44	5.8	48	8.1	64
East Midlands (Laxton and Litton 1988)	6.6	44	3.3	48	4.3	64
Hereford and Worcester (Siebenlist-Kerner 1978)	6.2	44	4.6	48	6.6	64
London1175 (Tyers pers comm)	5.4	44	3.7	48	5.1	64
Hants97 (Miles pers comm)	5.3	44	3.9	48	5.4	64
Hill Hall, Essex (Bridge 1999a)	6.7	44	3.9	48	6.0	64
Wimpole, Cambridgeshire (Bridge 1998b)	6.7	44	5.6	48	7.3	64
Widdington, Essex (Tyers 2001)	6.2	44	-	48	3.7	64
Sinai, Staffordshire (Tyers 1997)	5.5	44	5.0	48	6.2	64
Whitchurch, Oxfordshire (Miles and Haddon-Reece 1995)	5.5	44	-	48	-	64
Boyes Croft, Essex (Bridge 1999b)	-	44	6.9	48	6.5	64
Broomfield, Greater London (Bridge 1997)	4.9	44	-	48	5.2	64

Figure 5: Relative positions of overlap and interpreted felling dates for the three dated timbers from the Ancient House, Walthamstow

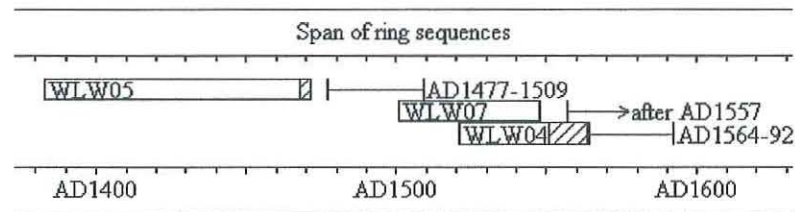


Table 4: Ring-width data for the sample WLW05 AD 1383 - 1472

ring widths (0.01mm)									
221	130	83	114	97	110	95	61	73	43
56	35	41	79	95	75	94	94	61	83
96	108	99	95	85	86	107	57	37	46
71	98	82	136	83	149	127	200	122	108
186	153	60	40	49	67	68	84	114	160
102	108	182	172	174	59	49	74	106	125
126	117	56	68	86	87	115	198	145	152
148	199	366	305	215	140	217	217	285	213
254	181	169	135	204	130	199	149	167	122

Table 5: Ring-width data for the site chronology WALTHAMSTOW AD 1501-64

ring widths (0.01mm)	no of trees																		
191	63	65	81	252	179	124	168	210	246	1	1	1	1	1	1	1	1	1	1
267	275	254	255	251	133	92	194	283	199	1	1	1	1	1	1	1	1	1	1
228	356	329	349	251	350	399	373	397	302	2	2	2	2	2	2	2	2	2	2
477	370	290	322	475	379	547	441	479	322	2	2	2	2	2	2	2	2	2	2
473	242	402	349	405	296	228	400	451	258	2	2	2	2	2	2	2	2	1	1
306	224	311	289	316	184	143	141	152	191	1	1	1	1	1	1	1	1	1	1
205	214	139	141							1	1	1	1						

gave such strong matches to the available data. Normally one would not expect such short sequences to date readily. This partly reflects the strength of chronology building within the East London and Essex areas in recent years giving several local data sets, although the samples showed matching with site chronologies from further afield too.

Only two dated samples had sapwood, both separated by several decades, and therefore interpretation of the dating of the west wing remains problematic. Sample WLW07 appears contemporaneous with WLW04, and both appear to be original to the primary structure of the west wing, and therefore it is suggested that the felling date range AD 1564-92 is probably representative of the date of this wing. This date range appears to agree well with stylistic dating, although clearly care needs to be taken not to place too much faith in a date from so few samples. The earlier date for sample WLW05 suggests the re-use of timber, or a timber that had been stockpiled before use. It is interesting that the character of this timber is quite different, being from an older, slower-growing tree. It also gives the best matches to chronologies from well to the north and west of the site, perhaps indicating a different geographical origin.

The use of elm for occasional timbers in the structure, coupled with the youth of the trees exploited in the construction of the west wing, suggests that perhaps quality oak timber was in short supply at this time in the area.

Acknowledgements

I would like to thank Gary Butler of Butler and Heggarty Architects for his help and discussion on site and for supplying drawings. Andy Wittrick (English Heritage) gave me a lot of background information, familiarising me with the site and having useful discussions about the site. I thank Cathy Groves (Sheffield University) for her helpful comments on an earlier draft of this report.

References

Baillie, M G L, and Pilcher, J R, 1973 A simple cross-dating program for tree-ring research, *Tree Ring Bulletin*, **33**, 7-14

Bridge, M C, 1997 *Tree-ring analysis of timbers from Broomfield House, Enfield, London*, Anc Mon Lab Rep, **98/97**

Bridge, M C, 1998a *Tree-ring analysis of timbers from the Bellframe and Bell Chamber Floor, Church of St Peter and St Paul, Cranfield, Bedfordshire*, Anc Mon Lab Rep, **35/98**

Bridge, M C, 1998b *Tree-ring analysis of timbers from the Chicheley Chapel, St Andrew's Church, Wimpole, Cambridgeshire*, Anc Mon Lab Rep, **59/98**

Bridge, M C, 1999a *Tree-ring analysis of timbers from Hill Hall, Theydon Mount, Essex*, Anc Mon Lab Rep, **55/99**

Bridge, M C, 1999b *Tree-ring analysis of timbers from Boyes Croft Maltings, Great Dunmow, Essex*, Anc Mon Lab Rep, **10/99**

Bridge, M C, 2000 Feb2000, *Working mean of all site masters produced by the author*, unpubl computer file, the author

Bridge, M C, 2001 *Dendrochronological investigation of samples from Badge Court, Elmbridge, Droitwich, Worcestershire WR9 0NJ, (NGR SO 905 699)*, unpubl report

Hollstein, E, 1965 Jahrringchronologische von Eichenholzern ohne Walkande, *Bonner Jahrb*, **165**, 12-27

Howard, R E, Laxton, R R and Litton, C D, 1996 Tree-ring analysis of timbers from the north aisle of St Nicholas' Church, Stanford-on-Avon, Northamptonshire, Anc Mon Lab Rep, 27/96

Howard, R E, Laxton, R R and Litton, C D, 1999 Tree-ring analysis of timbers from the Manor House, Medbourne, Leicestershire, Anc Mon Lab Rep, 63/1999

Laxton, R R, and Litton, C D, 1988 An East Midlands master tree-ring chronology and its use for dating vernacular buildings, University of Nottingham, Dept of Classical and Archaeological Studies, Monograph Series, **III**

Miles, D, 1997 The interpretation, presentation, and use of tree-ring dates, *Vernacular Architect*, **28**, 40-56

Miles, D, 2001 *Tree-ring analysis of timbers from St Swithun's Church, Compton Bassett, Calne, Wiltshire*, Centre for Archaeol Rep, **15/2001**

Miles, D H, and Haddon-Reece, D, 1995 List 64 - Tree-ring dates, *Vernacular Architect*, **26**, 60-74

Miles, D H, and Worthington, M J, 1997 Tree-ring dates, *Vernacular Architect* **28**, 159-81

Munro, M A R, 1984 An improved algorithm for crossdating tree-ring series, *Tree Ring Bulletin*, **44**, 17-27

Salzman, L F, 1952 *Building in England down to 1540*, Oxford

Siebenlist-Kerner, V, 1978 The chronology, 1341-1636, for certain hillside oaks from Western England and Wales, in *Dendrochronology in Europe* (ed J M Fletcher), BAR Int Ser, **51**, 157-61

Tyers, I, 1990 List 37 - Tree-ring dates, *Vernacular Architect*, **21**, 45-46

Tyers, I, 1996 *The tree-ring analysis of six secular buildings from the city of Hereford*, Anc Mon Lab Rep, **17/96**

Tyers, I, 1997 *Tree-ring analysis of timbers from Sinai Park, Staffordshire*, Anc Mon Lab Rep, **80/97**

Tyers, I, 1999 *Dendro for Windows Program Guide 2nd edn*, ARCUS Rep, **500**

Tyers, I, 2001 *Tree-ring analysis of oak timbers from the Outbuildings at Prior's Hall, Widdington, Essex*, Centre for Archaeol Rep, **46/2001**