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Summary

This late medieval hall-house, typical of many in the London region, is dated to the last half of the fifteenth century, based on the results for a corner post and a mid-rail. A second truss is dated over a century later - this originally formed part of an adjacent building which has now been incorporated into number 17. This confirms the dating of the building on stylistic grounds. The timbers of the roof were found to contain very few rings and some elm was used.

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TREE-RING ANALYSIS OF TIMBERS FROM 17 GENTLEMAN'S ROW, ENFIELD, LONDON

Introduction

This report details the dendrochronological work carried out at 17 Gentleman's Row, Enfield, Greater London (NGR TQ325978) at the request of Richard Bond of English Heritage.

This building incorporates two bays remaining from what may have once been a larger timber-framed hall house. A drawing of an intermediate crossframe of this phase is shown in Figure 1a. A third bay to the north was originally part of the adjacent property and is probably of later construction, it is illustrated in Figure 1b. The present building has additional wings added in the eighteenth century and constructed from pine. This building is typical of a number of medieval hall-houses throughout the London region, none of which have been firmly dated as yet. The purpose of this investigation therefore was to see if one example of these houses could be more firmly dated than the current 'late-medieval' tag based on stylistic grounds.

Methodology

The building was visited in March 1997. Timbers were inspected to see if those with sufficient rings for dendrochronological dating could be identified. Where there was little indication of the number of rings in the timber, cores were extracted from those which looked most promising, bearing in mind the necessity to cause as little damage as possible and in sympathy with the wishes of the owners.

Samples were removed using purpose-made 15mm diameter corers attached to an electric drill (a system developed from commercially available corers by Don Shewan at London Guildhall University). The resulting holes were plugged using softwood dowel glued into place with Evostick wood adhesive. Where possible, cores were taken along a radius through sapwood.

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. Those samples with more than 50 annual rings had their 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 an Atari desktop computer. The software used in measuring and subsequent analysis was written by Ian Tyers (pers comm 1992).

Suitably long ring sequences were plotted on translucent semi-log graph paper 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. Statistical comparisons were made using standard dendrochronological software (Baillie and Pilcher 1973; Munro 1984). Any internal site mean sequences produced are then compared with a number of reference chronologies (multi-site chronologies from a region) and dated individual site masters in an attempt to date them.. The *t*-values quoted below were derived from the original CROS program (Baillie and Pilcher 1973) in which *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 (Baillie 1982, 82-5).

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 likely felling dates of the trees used and then relate these in turn to the construction date of the phase

under investigation. Where only heartwood is found on the sample, one can make allowances for the expected number of sapwood rings on the tree and add this to the date of the last available ring to give a date after which felling took place; one does not know how many heartwood rings may be missing in these cases. Where the heartwood/sapwood boundary is found, or some sapwood rings survive, a felling date range can be calculated using the best available estimate of the number of sapwood rings likely to have been on the original tree (Baillie 1982).

In this report, the sapwood estimate employed is a minimum of 10 rings and a maximum of 55 rings, representing the 95% confidence limits derived by Hillam *et al* (1987). Where bark is present, the year of felling will be the date of the last surviving ring. In such cases it is often possible to determine the season of cutting by looking at how much of the ring has been formed.

The dates derived for the felling of the trees used in construction do not necessarily relate directly to the date of construction of the roof. 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

Of the twelve samples taken, only five were measured, the remainder having too few rings to be dated dendrochronologically. GTR01 had only 44 rings but it was measured to see if any visual match could be made with other samples from the same truss. No such crossmatch was found.

All timbers were of oak except the inserted central beam in the attic-space of the southern-most bay, which was of elm.

Sequence GTR12 was from the uppermost jowl of the post to what is now the middle bay, but this short (64-year) ring-width curve with little variation in its rings did not crossmatch GTR04 taken from lower down on the same post, or any other timbers from the site.

GTR05 contained *c*176 rings, including *c*15 sapwood rings (Table 3) with an average ring-width of only 0.36 mm. These rings are much smaller than usually encountered in this region and may represent growth in unusual conditions. This sequence contained sections of very narrow rings where it was extremely difficult to determine ring-width boundaries (hence the uncertainty over the total number of rings).

Only two complete samples dated, GTR02 and GTR04. However, when the material was reassessed, it was decided to use the first 100 rings of sample GTR05. These early rings did not exhibit the very narrow sections seen later in the sequence. This first part of the sample matched well with GTR04 (t = 5.4 with 65 years of overlap) and the two sequences were combined to produce a new sequence GTR04+GTR05(part). The ring-width sequences are shown in Table 3, whilst the results of the statistical crossmatching are shown in Table 2.

Interpretation

Although only three individual timbers dated, from two different phases, this does give useful information. The presence of 25 sapwood rings on sample GTR04 (the north-east corner post of the original building) allows a reasonably narrow range for the felling date of the tree used to be determined. Although the precise date of the outer ring of GTR05 could not be determined because of the groups of very narrow rings in the sequence, the total number of rings on the sample is probably within ± 2. The presence of sapwood on the outside of this sample allows for a felling date estimation on this second timber - the results shown in Table 1 have a small margin of error because of the uncertainty over the total number of rings. This second date

from the mid-rail of a crossframe confirms the date from the corner post. The appearance of the post noted at the time of sampling suggests that the outermost rings were probably close to the bark surface. The felling date of this timber is quite likely to be in the earlier part of the range AD 1465 -1494, but with no bark present this cannot be determined with any certainty. If one accepts the dating of stylistically similar buildings on the basis of this one piece of evidence, this suggests that several such houses in the London region probably date to this period. The strongest crossmatching is with chronologies from London and the south-east, which may suggest a local origin for the timber, although such a conclusion needs to be made with great caution (Bridge forthcoming).

The date for GTR02 refers to the last measured heartwood ring. The core had an additional 20 rings which could not be measured, taking the wood to the heartwood-sapwood boundary. Applying the accepted allowance for missing sapwood (Hillam *et al* 1987) to this sequence produces a likely felling date range of AD 1583 - 1628. This confirms the view that this truss was from a building put up more recently than the original hall-house, and suggests that it was constructed over a century later. A number of the stronger crossmatches of this timber are with chronologies from areas well to the west of London, although good crossmatching is also found with London-based chronologies. It is therefore even more hazardous to attempt to deduce a geographical origin for this timber.

Acknowledgements

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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

Baillie, M G L, 1982 *Tree-Ring Dating and Archaeology*, London

Bridge, M C, 1983 The use of tree ring-widths as a means of dating timbers from historic sites, unpubl PhD thesis, Portsmouth Polytechnic

Bridge, M C, 1988 The dendrochronological dating of buildings in southern England, *Medieval Archaeol,* **32,** 166-74

Bridge, M C, forthcoming The concept of regionality in British dendrochronology. *Proc of the Anthropology and Archaeol Section, British Association for the Advancement of Science,* University of Keele, September 1993

Bridge M C, 1997 *Tree-ring analysis of timbers from Bruce Castle, Tottenham, London* Anc Mon Lab Rep, 69/97

Hillam, J, Morgan, R A, and Tyers, I, 1987 Sapwood estimates and the dating of short ring sequences, in *Applications of tree-ring studies: current research in dendrochronology and related areas* (ed R G W Ward), BAR Int Ser, **333**, 165-85

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

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

Laxton, R R, and Litton, C D, 1989 Construction of a Kent master chronological sequence for oak, 1158 - 1540 AD, *Medieval Archaeol,* **33**, 90-98

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, 1993 Tree-ring dating at Cressing Temple, and the Essex curve, in *Cressing Temple. A Templar and Hospitaller Manor in Essex* (ed D Andrews), 77-83

Tyers, I, 1997 Tree-ring analysis of the hall and barn at Great Tomkyns, Upminster, Greater London, Anc Mon Lab Rep, **11/97**

Table 1. List of samples taken from 17 Gentleman's Row, Enfield, London

Sample No.	Origin of Sample	Total No. of years	Sapwood details	Average growth rate (mm yr^{-1})	Date of sequence	Felling date of timber
GTR01	Tie to north truss	44	H/S?	1.42	-	-
GTR02	North-east corner post	125	+20 rings to H/S	0.58	1429 - 1553	1583-1628
GTR03	Wall plate, north bay	24			not determined	
GTR04	East post to middle truss	139	25	0.57	1326 - 1464	1465 - 1494
GTR05	Mid-rail of cross-frame between north and middle bay	*c*176	*c*15	0.36	1291 - *c*1466	*c*1466 - 1506
GTR06	Floor joist (4th from south)	24			not determined	
GTR07	Floor joist (5th from south)	19			not determined	
GTR08	South-west purlin	8			not determined	
GTR09	Collar	25			not determined	
GTR10 (Elm)	South central floor beam	-				
GTR11	Tie to middle truss	26			not determined	
GTR12	as GTR04, through jowl	64	-	0.46	-	-

H/S = heartwood/sapwood boundary

Table 2. Dating of the site master chronology for oak timbers from 17 Gentleman's Row Enfield, London.

	GTR02	
	1429 - 1553	
Dated reference or site master chronology	*t*-value	Overlap (yrs)
London1175 (Tyers pers comm)	8.1	125
Hereford and Worcester (Siebenlist-Kerner 1978)	6.7	125
Southwark (Tyers pers comm)	6.0	125
Kent (Laxton and Litton 1989)	5.9	125
Oxon93 (Miles pers comm)	5.9	125
East Midlands (Laxton and Litton 1988)	5.8	125
S. England (Bridge 1988)	4.9	125
Windsor Castle Kitchen (Hillam pers comm)	7.0	
Martin Tower, Tower of London (Bridge 1983)	5.5	106
Bruce 2 (Bridge 1997)	5.1	116
Bayton, Worcs. (Bridge unpubl)	5.1	97
	GTR04	
	1326 - 1464	
London1175 (Tyers pers comm)	5.6	139
Kent (Laxton and Litton 1989)	4.4	139
Southwark (Tyers pers comm)	4.4	139
Sutton House (Tyers pers comm)	5.0	139
Cressing 2 (Tyers 1993)	3.9	139
	GTR04 + GTR05 (first 100 years)	
	1291 - 1464	
London1175 (Tyers pers comm)	4.5	174
Southwark (Tyers pers comm)	4.8	174
Kingst (Miles pers comm)	5.6	157
Upminster (Tyers 1997)	5.5	124
Sutton House (Tyers pers comm)	5.0	146
Cressing 2 (Tyers 1993)	3.9	139

Table 3. Ring-width data for the single timber series GTR02, GTR04, and GTR04+GTR05(part)

GTR02 AD 1429 - 1553

Year	ring widths (0.01mm)									
AD1429									35	30
	37	58	36	51	59	42	55	46	47	47
	45	42	48	67	53	35	40	51	35	38
AD1451	46	30	28	44	35	49	55	41	54	48
	49	48	80	45	98	70	47	64	59	52
	47	77	52	72	89	83	50	47	70	80
	82	90	86	76	69	81	100	84	95	93
	74	51	65	62	57	122	77	51	72	44
AD1501	33	27	31	38	39	43	55	36	54	58
	53	49	50	51	53	48	61	68	64	55
	50	51	43	47	41	37	47	61	62	58
	73	49	57	63	68	59	63	53	87	76
	73	59	67	60	73	59	60	75	100	66
AD1551	63	58	79							

GTR04 AD 1326 - 1464

Year	ring widths (0.01mm)									
AD1326						82	88	129	103	92
	73	64	86	117	124	98	62	55	87	105
	79	73	52	102	131	111	95	87	85	85
AD1351	109	104	92	81	72	63	85	49	64	70
	68	84	104	100	77	70	70	70	112	91
	67	70	77	55	69	57	68	61	67	55
	65	58	52	53	59	61	45	49	44	33
	36	55	57	78	61	61	51	53	92	66
AD1401	62	51	88	70	62	59	54	54	53	36
	31	32	35	26	24	24	25	27	29	25
	42	29	28	29	26	23	33	31	26	31
	23	43	32	23	34	29	27	36	24	28
	25	45	36	38	31	36	30	36	40	26
AD1451	33	28	36	29	30	29	29	28	26	17
	33	38	37	27						

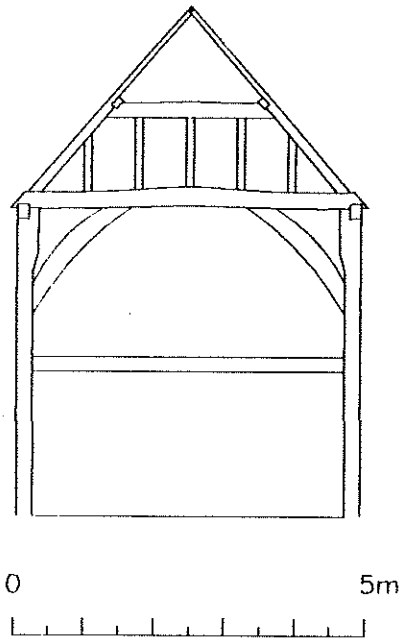
GTR04+GTR05(part) AD1291 to AD1464

Year	ring widths (0.01mm)									
AD1291	218	132	101	42	30	32	39	42	41	35
AD1301	84	129	99	122	83	59	36	54	63	59
	44	43	39	56	59	49	56	43	40	45
	69	67	80	70	44	57	60	84	73	63
	58	58	71	108	111	75	49	44	69	83
	56	50	44	71	89	85	69	60	53	54
AD1351	86	72	58	57	50	48	63	35	51	53
	50	57	73	75	55	49	55	48	83	69
	48	50	55	47	48	40	46	46	50	41
	44	42	37	39	42	44	36	42	33	25
	37	56	58	79	62	62	52	54	93	67
AD1401	63	52	89	71	63	60	55	55	54	37
	32	33	36	27	25	25	26	28	30	26
	43	30	29	30	27	24	34	32	27	32
	24	44	33	24	35	30	28	37	25	29
	26	46	37	39	32	37	31	37	41	27
AD1451	34	29	37	30	31	30	30	29	27	18
	34	39	38	28						

Figure 1. Drawings of a) section through 17 Gentleman's Row, Enfield, London, showing an intermediate crossframe thought to be of late 15th century origin, and b) the gable truss of a house formerly standing to the north of number 17, now incorporated into the property.

(based on drawings supplied by Richard Bond)

a)



b)