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TREE-RING ANALYSIS OF TIMBERS FROM WALNUT TREE HOUSE, LUXTED ROAD, DOWNE, KENT

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Summary

This house represents a possible Wealden house which has subsequently been over-roofed and re-clad, with eighteenth-, nineteenth-, and twentieth-century repairs and alterations. The oldest remains of the roof structure are unsmoked, but of uncertain age. Most timbers were painted and an assessment of their potential use for dendrochronological dating was only possible by coring. All the timbers other than one were found to have less than forty rings, and were not subsequently analysed. One timber, a tie beam under a crown-post had 61 rings, but did not date.

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Introduction

Walnut Tree House (NGR TQ 43156166) was largely refaced in the eighteenth century, but the framing, including a crown-post roof, suggests a much earlier origin, possibly as a Wealden house. Much of this framing has been recently exposed during alterations to the house, and dating was requested to inform Listed Building Consent for the proposed work. The request for this work came from the English Heritage inspector, Malcolm Woods, and site work was carried out in the presence of Andy Wittrick from the Historical Analysis and Research Team, English Heritage, who made notes on the structure and gave advice on the areas to be assessed for dendrochronological study. Three phases of building are readily identifiable, but dating was only sought for the earliest phase.

Methodology

The site was visited in December AD 1999, when the timbers were assessed for their potential use in dendrochronological study. This was a particularly difficult task since most of the timbers were covered in layers of paint, obscuring the wood below, such that one could not even tell what species the wood was before coring.

Core samples were obtained 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. Only samples with more than 45-50 rings were measured and used in subsequent analyses as sequences with fewer than this number of rings rarely give reliable crossmatching. 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). 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 meaned to form an internal site mean sequence 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. 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 and Discussion

Most of the timbers in this building had been painted several times, making an assessment of the number of rings within them impossible from external inspection. All the timbers sampled were oak (*Quercus* spp.). Details of the samples and their origins within the building are given in Table 1. Although sapwood was evident on several timbers, when cored, the samples were found to contain very few rings, having come from very fast-grown trees. Many samples were not measured as it was quickly apparent that the sequences were too short for dendrochronological dating. Sample WTD07 from the central tie beam supporting the crown-post in the main bedroom contained 61 rings. This ring-width sequence (Table 2) was compared with a range of regional and site chronologies, but no consistent crossmatching was found.

The average ring-width of this timber is relatively large, showing that the tree it came from had grown relatively quickly. This was also true of the other timbers, but being of smaller overall dimension, they had fewer rings. Some of the timbers contained both pith and the heartwood-sapwood boundary (eg WTD01), indicating that the trees had reached usable dimensions in under fifty years. Had the wood itself been visible, it is unlikely that any sampling would have been carried out in this building.

Acknowledgements

I would like to thank the owners of the property, Mr and Mrs Anderson, for allowing access to the building, and Andy Wittrick (English Heritage) for his assistance and encouragement on site. English Heritage funded this work.

Table 1: Oak (*Quercus* spp.) timbers sampled from Walnut Tree House, Downe, Kent.

h/s = heartwood-sapwood boundary

Sample number	**Origin of core**	**Total no of years**	**Average growth rate (mm yr^{-1})**	**Sapwood details**	**Date of sequence AD**	**Felling date of timber AD**
WTD01	Crown plate, north-east end of building	38	not measured	?h/s	unknown	unknown
WTD02	Post supporting crown plate in partition wall	*c*35	not measured	h/s	unknown	unknown
WTD03	Intermediate post, north-west wall	21	not measured	2	unknown	unknown
WTD04	North-west wall plate	<40	not measured	Approx 2cm lost	unknown	unknown
WTD05	North-west mid-rail	<40	not measured	-	unknown	unknown
WTD06	North-east corner post	20	not measured	5	unknown	unknown
WTD07	Central tie beam, main bedroom	61	2.56	-	unknown	unknown
WTD08	Central post, south-east wall	<40	not measured	-	unknown	unknown
WTD09	Tie beam, south west end	*c*35	not measured	5	unknown	unknown
WTD10	South-west corner post	*c*25	not measured	-	unknown	unknown
WTD11	South-west wall plate	*c*25	not measured	-	unknown	unknown

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Table 2: Ring-width data for sample WTD07

Year	ring widths (0.01mm)									
1	410	408	412	433	338	358	406	452	428	379
	372	299	231	268	320	277	229	283	231	352
	434	287	359	363	315	393	318	359	330	167
	209	203	177	128	115	112	135	143	163	155
	192	198	169	208	182	166	189	156	102	102
51	171	160	209	231	143	139	194	216	194	316
	223									