Ancient Monuments Laboratory
Report 100/89

TREE-RING ANALYSIS OF ROMAN TIMBERS FROM WATLING COURT, CITY OF LONDON.

Jennifer Hillam

AML 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 asked to consult the author before citing the report in any publication and to consult the final excavation report when available.

Opinions expressed in AML reports are those of the author and are not necessarily those of the Historic Buildings and Monuments Commission for England.

Ancient Monuments Laboratory Report 100/89

TREE-RING ANALYSIS OF ROMAN TIMBERS FROM WATLING COURT, CITY OF LONDON.

Jennifer Hillam

Summary

The analysis of the five oak timbers was originally carried out in 1980. Although no absolute dating was obtained, a 167 year tree-ring chronology was produced. This report describes the 1980 and later studies in which four of the timbers were absolutely dated, giving a date span for the chronology of 110BC-AD57. This report supercedes AML Report No 3259.

Author's address :-

Jennifer Hillam

Department of Archaeology And Prehistory
University of Sheffield
Sheffield
S.Yorks
S10 2TN

© Historic Buildings and Monuments Commission for England

Tree-ring analysis of Roman timbers from Watling Court, City of London.

Introduction

Five oak timbers (*Quercus* spp) from Watling Court (site code WAT'78) were examined in the Sheffield Dendrochronology Laboratory in 1980. All were squared piles which had been driven through the backfill of pit 2314. Other archaeological evidence suggested that the piles dated to the late 1st century AD. Dendrochronological analysis was undertaken in order to try to refine this date.

No absolute dating was obtained from the initial study because of the lack of dated reference chronologies (Hillam 1981). However a site master curve was produced which matched with other chronologies from the City of London. This was dated later when more reference data became available (Hillam & Morgan 1981). This report summarises the results of the 1980 and later studies, and relates them to current dendrochronological research.

Methods and results

The samples were prepared, measured and crossmatched following the method outlined by Hillam and Morgan (1986). Further details of the principles and methods of tree-ring dating can also be found in Baillie (1982).

The timbers contained 70 to 180 rings, and one of them (2415) included 7 sapwood rings (Table 1). Four of the ring sequences crossmatched to give a site master curve of 167 years (Fig 1). When the sequences were tested against each other using the CROS computer program (Baillie & Pilcher 1973), the resulting t values were good (Table 2).

In the 1980 study, it was established that the Watling Court master (Table 3)

matched well with tree-ring sequences from other sites in London, such as Thames Street Tunnel (t = 10.6), Milk Street (t = 4.0) and New Fresh Wharf/Seal House (t =5.5). There are now many more Roman chronologies from London and elsewhere in the British Isles, all of which are absolutely dated. The Watling Court master not only matches with chronologies from London but it is also synchronous with sequences from sites as far away as Droitwich in Hereford and Worcester or Caerleon in Wales (Table 4). This crossmatching dates the Watling Court chronology to the period 110BC-AD57.

No match was found for sample 2427, either with the Watling Court master or with other dated reference chronologies.

Discussion

The tree-ring dates described above do not represent the year of felling since none of the timbers had bark or bark edge. However it is possible to estimate the probable felling date range because one of the timbers, 2415, had sapwood. A recent study showed that the number of sapwood rings in British oak trees older than 30 years varies between 10 and 55 (Hillam et al 1987), and these 95% confidence limits allow the determination of felling dates in the absence of complete sapwood. The date of the heartwood-sapwood transition of 2415 is AD51, which gives a probable felling date range for 2415 of AD60-105 (Table 5). The other dated timbers had no sapwood so that felling dates must estimated as *termini post quem*. These are all earlier than AD60 and therefore do not help to refine the felling date range obtained for timber 2415.

The timbers were hewn into rough rectangular shapes from halved (eg 2417) or quartered (eg 2431) tree trunks (Table 1). 2413 had wider rings, and was therefore faster grown than the other timbers. However there was good

agreement between all the four matching sequences. This contrasts with the situation at Billingsgate Lorry Park, for example, where there is often little correspondence between the ring patterns from a particular context or structure (Hillam unpubl). It may suggest that the Watling Court timbers were cut from the same woodland for a specific purpose, whereas the Billingsgate results may indicate some degree of re-use or stockpiling. It is also worth noting that the Watling Court ring sequences match particularly well with sequences from other 1st century AD structures at Thames Street Tunnel and at the Bridgehead sites (Miles Lane, Peninsular House, Pudding Lane), and this may suggest that similar sources of woodland around London were being exploited.

Conclusion

Four of the timbers from Watling Court were relatively dated in 1980, producing a site master curve of 167 years. This was later dated to 110BC-AD57. A felling date range of AD60-105 was obtained for the piles, which confirms but does not refine the archaeological dating.

Acknowledgements

The work was funded by HBMC(E). I am also grateful to Anne Crone, Ruth Morgan and Ian Tyers for making available unpublished data.

References

Baillie MGL 1982 *Tree-Ring Dating and Archaeology*, London: Croom Helm.

Baillie MGL & Pilcher JR 1973 A simple crossdating program for tree-ring research, *Tree Ring Bulletin* 33, 7-14.

Groves C 1988 Tree-ring analysis of timbers from Upwich, Droitwich, 1983-84.

Ancient Monuments Laboratory report series 134/88.

Groves C & Hillam J 1987 Tree-ring analysis of timbers from Swan Lane, City of London, 1981. *Ancient Monuments Laboratory report series* 30/87.

Hillam J 1981 Watling Court (WAT'78). Interim dendrochronological report. *Ancient Monuments Laboratory report series* 3259.

Hillam J 1984 Tree-ring analysis - Mancetter excavations, 1977. *Ancient Monuments Laboratory report series* 4169.

Hillam J 1986 The Bridgehead sites and the dating of the Roman harbour in London. *Ancient Monuments Laboratory report series* 4794.

Hillam J 1987 Tree-ring analysis of Roman timbers from Caerleon, Museum site, 1983-85. *Ancient Monuments Laboratory report series* 43/87.

Hillam J & Morgan RA 1981 Dendro dates from Sheffield. *Current Archaeology* 7(9), 286-7.

Hillam J & Morgan RA 1986 Tree-ring analysis of the Roman timbers. In L Miller, J Schofield & M Rhodes, *The Roman quay at St Magnus House, London. Transactions London & Middlesex Archaeology Society* special paper no 8, 75-85.

Hillam J, Morgan RA & Tyers I 1987 Sapwood estimates and the dating of short ring sequences. In RGW Ward (ed), *Applications of tree-ring studies: current research in dendrochronology and related areas*, BAR S333, 165-85.

Table 1: Details of the tree-ring samples. Sketches are not to scale; shading indicated sapwood.

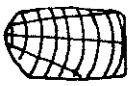
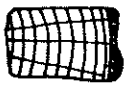
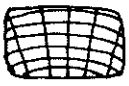
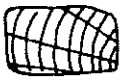
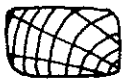
timber no	total no of rings	sapwood rings	average ring width (mm)	sketch	maximum dimensions (mm)
2413	70	-	3.03		190 x 130
2415	143	7	1.19		180 x 130
2417	116	-	1.72		200 x 190
2427	180	-	0.94		180 x 130
2431	121	-	1.55		180 x 140

Table 2: t value matrix showing the correlation between the Watling Court ring sequences.

	t value			
	2413	2415	2417	2431
2413	*	4.3	4.7	3.2
2415		*	3.9	5.4
2417			*	4.7
2431				*

Table 3: Watling Court master chronology, 110BC-AD57. Samples 2413, 2415, 2417 and 2431 are included; see figure 1 for the relative positions of their ring sequences.

years	ring widths (0.01mm)									
110BC	150	140	210	190	250	190	220	150	110	150
100BC	170	130	150	110	100	150	160	200	120	110
	130	110	200	100	145	130	115	160	160	205
	160	190	150	145	175	115	175	205	217	180
	193	127	150	147	173	170	133	120	193	130
	127	127	147	143	183	147	107	167	163	183
50BC	207	200	117	157	140	180	177	150	183	140
	183	160	190	133	147	123	150	120	87	117
	150	150	123	173	200	180	150	123	163	150
	133	170	213	185	158	228	233	158	175	113
	150	203	145	198	233	193	190	180	158	158
AD1	198	223	220	153	173	195	183	153	197	153
	177	133	147	127	213	170	183	203	227	300
	310	280	263	297	157	233	282	230	210	127
	120	147	150	173	170	113	137	216	216	163
	223	287	210	220	150	105	120	160	120	90
AD51	100	120	100	150	100	90	60			

Table 4: Dating the Watling Court master. Examples of t values with dated reference chronologies.

chronology	t value with Watling Court
Caerleon, Wales (Hillam 1987); 47BC-AD72	3.6
Canterbury, Rosemary Lane (Hillam unpubl); AD38-129	3.3
Droitwich, Old Bowling Green (Crone pers comm); 215BC-AD25	6.7
Droitwich, Upwich (Groves 1988); 256BC-AD61	3.9
London, Bridgehead - Miles Lane, Peninsular House, Pudding Lane (Hillam 1986); 252BC-AD86	12.8
London, City/Southwark (Tyers pers comm); 252BC-AD259	10.9
London, New Fresh Wharf/Seal House (Morgan unpubl); 73BC-AD209	5.5
London, Swan Lane (Groves & Hillam 1987); 56BC-AD169	4.6
London, Southwark 64 timber master (Tyers pers comm); 170BC-AD231	10.6
London, Thames Street Tunnel (Hillam unpubl); 159BC-AD39	10.6

Table 5: Details of tree-ring dates and estimated felling dates. The latter are based on the sapwood estimate of 10-55 rings. The date of the heartwood-sapwood transition, if present, is given in brackets.

			t value with		
			London	London	Droitwich
timber	date span	felling date	Bridgehead	Southwark	Bowling Green
2413	25BC-AD45	AD55+	7.8	6.2	2.7
2415	86BC-AD57(AD51)	AD60-105	9.1	7.6	5.5
2417	110BC-AD6	AD16+	9.1	7.3	6.3
2431	72BC-AD49	AD59+	7.1	6.5	3.7

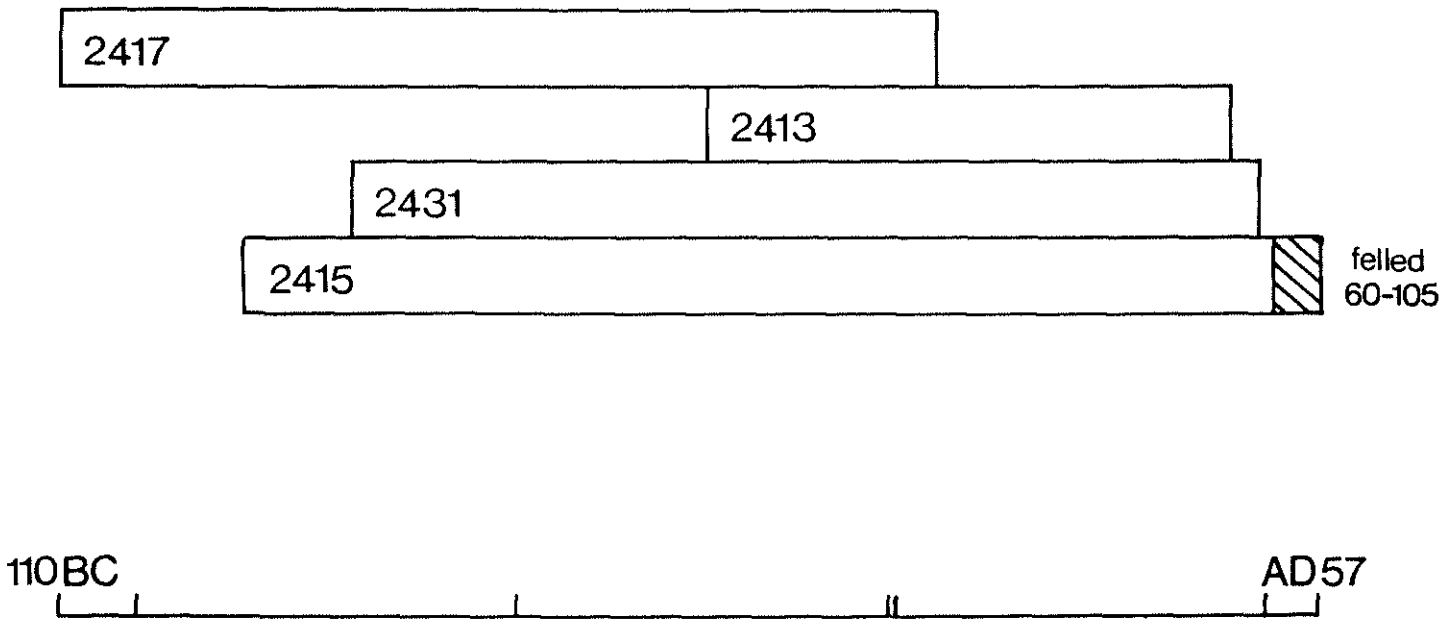


Fig 1: Bar diagram showing the relative positions of the dated ring sequences. White bar - heartwood rings; hatching - sapwood.