Ancient Monuments Laboratory
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Summary

Seven timbers were sampled from the common-rafter roof of the west cottage at Elmside during recent renovation work. Six cores proved to be unsuitable for dating but a ring sequence from one of the collars crossmatched extremely well with a chronology from Exeter Cathedral. The timber was felled some time after AD1303 and possible before about 1348.

Authors' address :-

Miss Jennifer Hillam

Department of Archaeology & Prehistory
Sheffield University
Clarke House Lane
Sheffield, South Yorkshire
S10 2TN

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The Grade II listed buildings at Elmside near Crediton are represented by two cottages. The one to the east is a 3-room plan cottage of 18th century date; that to the west was until recently thought to be 17th century in date with 19th century alterations. The removal of the 19th century ceiling from the latter during renovation work revealed a smoke blackened common-rafter roof which appeared to be 14th century in date (R Barker pers comm). Tree-ring analysis was undertaken in 1991 to determine a more precise date for this common-rafter roof.

Methods

One of the collars had been removed during building work and was available for study. The cross-section was cleaned with a Stanley knife and the rings measured *in situ* using a hand lens containing a scale accurate to 0.1mm. Cores were taken from six of the rafters using a corer attached to an electric drill. The holes left by the cores were plugged with cotton wool for easy identification.

The ring widths were measured on a travelling stage built in the Department of Geography, City of London Polytechnic. The stage is connected to an Atari microcomputer which uses a suite of dendrochronology programs written by Ian Tyers (pers comm 1990). Samples with less than 50 rings were rejected since their ring patterns are unlikely to be unique and might not produce reliable dates - see Hillam *et al* 1987 for further details. Ring widths from samples measured *in situ* were typed into the Atari and converted to units of 0.01mm. The measured ring sequences were plotted as graphs using a graphing program on the Prime mainframe (Okasha 1987). Where more than one ring sequence is obtained from a site, the graphs are compared with each other on a light box to check for any similarities between the ring patterns which might indicate

contemporaneity. The Atari is also used to aid the crossmatching process. The crossmatching routines are based on the Belfast CROS program (Baillie & Pilcher 1973; Munro 1984), and all the t values quoted in this report are identical to those produced by the first CROS program (Baillie & Pilcher 1973). Generally t values of 3.5 or above indicate a match provided that the visual match between the tree-ring graphs is acceptable (Baillie 1982, 82-5).

Dating is achieved by crossmatching ring sequences within a phase or building, combining the matching sequences into a site master, and then testing that master for similarity against dated reference chronologies. A site master is used for dating whenever possible because it enhances the general climatic signal at the expense of the background noise from the growth characteristics of the individual samples. Any unmatched sequences are tested individually against the reference chronologies.

If a sample has bark or bark edge, the date of the last measured ring is the year in which the tree was felled. In the absence of bark edge, felling dates are calculated using the sapwood estimate of 10-55 rings. This is the range of the 95% confidence limits for the number of sapwood rings in British oak trees over 30 years old (Hillam *et al* 1987). Where sapwood is absent, felling dates are given as *termini post quem* by adding 10 years, the minimum number of missing sapwood rings, to the date of the last measured heartwood ring. The actual felling date could be much later depending on how many heartwood rings have been removed.

Results

The timbers were all oak (*Quercus* spp) of small scantling; they were shaped from either a quartered trunk or from the widest part of a halved trunk (Fig 1). Sapwood was not detected on the timbers suggesting that it was always removed during timber conversion.

The collar had 94 measurable rings plus a further 9 outer rings which were unmeasurable. The six rafters had 12 to 47 rings (Table 1) and were therefore unsuitable for dating purposes.

When the 94-year collar ring sequence (Table 2) was compared with dated reference chronologies, an excellent match ($t = 8.10$) was found with a chronology from Exeter Cathedral over the period AD1190-1283 (Fig 2). It also matched other chronologies, though less well. For example, the Tiverton Castle chronology, another Devon sequence, gave a t value of 3.98 (Table 3). The similarity between the timber from Elmside and those from Exeter Cathedral may indicate that the timber came from the same area of woodland (for more information on the provenance of the Cathedral timbers, see Mills 1989).

The date of the outer ring of the collar becomes 1293 when the 9 unmeasured rings are taken into account. The *terminus post quem* for felling is therefore 1303. If the sapwood was removed without the loss of much heartwood, the timber is likely to have been felled before about 1348. This confirms the 14th century date postulated on stylistic grounds, and suggests that the common-rafter roof was constructed in the first half of that century.

Acknowledgements

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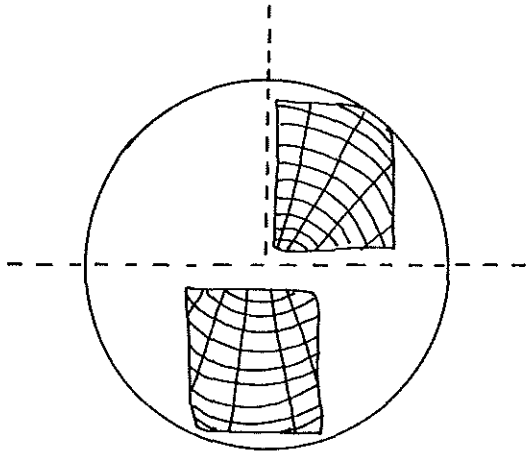

Fig 1: Schematic drawing showing the way in which the Elmside timbers were converted from the parent trunk.

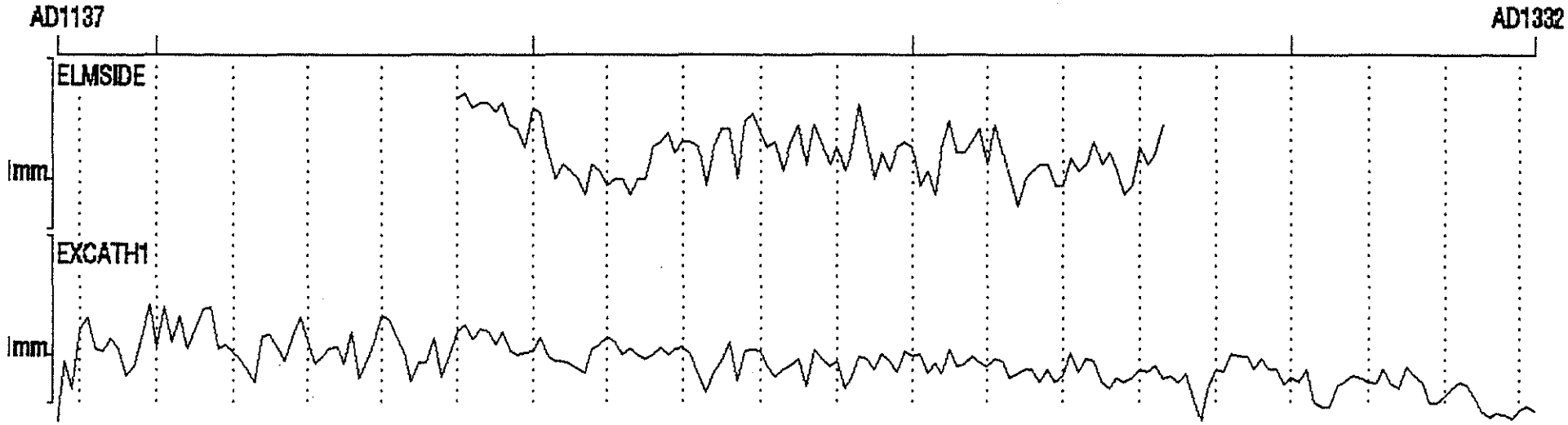

Fig 2: Tree-ring match between the ring sequence from the dated Elmside collar beam and the chronology EXCATH1 from Exeter Cathedral (Mills 1988).

Table 1: Details of the tree-ring samples.

no	timber	total no of rings	sapwood rings	average ring width (mm)	date span	felled	comments
1	collar (timber not in situ)	94+	-	1.49	1190-1283+	1303+	plus 9 outer rings; cross-section 140x90mm
2	interrupted tiebeam above sample 3	-	-	-	-	-	photograph, unsuitable
3	4th rafter from west wall south side	18	-	-	-	-	core
4	5th rafter from east wall north side	34	-	1.61	-	-	core
5	6th rafter from east wall north side	42	-	2.12	-	-	core
6	2nd rafter from east wall north side	12	-	-	-	-	core
7	8th rafter from east wall north side	47	-	1.87	-	-	core
8	3rd rafter from east wall north side	24	-	wide	-	-	core

Table 2: Ring width data of Elmside 1, AD1190-1283.

date (AD)	ring widths (0.01mm)									
1190										280
1191	300	250	270	270	240	270	200	190	150	250
1201	240	140	100	120	110	100	80	120	110	90
1211	100	100	80	100	100	150	160	180	140	160
1221	160	150	90	150	190	190	100	210	230	180
1231	150	160	110	160	200	120	200	160	120	150
1241	110	150	260	170	100	140	110	150	160	150
1251	90	110	80	150	210	140	140	160	190	120
1261	200	140	100	70	100	110	120	120	90	90
1271	130	110	120	160	120	140	110	80	90	150
1281	120	140	200							

Table 3: Dating the Elmside ring sequence. t values with dated reference chronologies.

chronology	t value
Exeter Cathedral, EXCATH1 (Mills 1988)	8.1
Glastonbury Abbey Barn (Bridge 1983)	3.9
Great Coxwell Barn (Haddon-Reece pers comm)	4.8
London, Little Britain pit (Tyers pers comm)	4.5
London, Pickfords B, revetment 2 (Tyers pers comm)	3.6
Reading Abbey Waterfront (Groves et al 1985)	4.2
Tiverton Castle, Devon (Haddon-Reece pers comm)	4.0
Winterbourne Tythe Barn, Bristol (Hillam unpubl)	3.8