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Ancient Monuments Laboratory
Report 45/91

TREE-RING ANALYSIS OF OAK TIMBERS FROM ST JOHN THE BAPTIST'S CHURCH, HATHERLEIGH, DEVON

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Summary

Tree-ring data were collected from seven of the most suitable timbers belonging to the collapsed spire at Hatherleigh. No relative or absolute dating was obtained.

Authors' address :-

Miss Jennifer Hillam & C Groves

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

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The medieval timber spire of St John the Baptist's Church was completely destroyed in the storm of 25th January 1990 when the timbers crashed through the nave roof. The timbers were recorded in detail by the Exeter Museums Archaeological Field Unit (Westcott 1991) after which they became available for dendrochronological dating. The timbers were examined in their temporary store near to the church and seven of the most suitable timbers were selected for study. Cores were removed from the two timbers with the longest ring sequences (A6 from the base platform, spire rafter SR1). The ring widths of the other five timbers were measured *in situ* (A3, A7, A9, A11 from the base platform; I1 from platform 1). The remaining medieval timbers were very wide-ringed and consequently generally had less than 50 annual growth rings. This makes them unsuitable for dating purposes (see Hillam *et al* 1987 for further details).

Methods

The cores were taken using a corer attached to an electric drill. The holes left by the cores were plugged with cotton wool for easy identification. The cross-sections of the remaining samples were cleaned with a Stanley knife and the rings measured *in situ* using a hand lens containing a scale accurate to 0.1mm.

The ring widths of the cores were measured to an accuracy of 0.01mm 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). 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). The

graphs were then 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.

Results

The cores from A6 and SR1 had 105 and 76 rings respectively and their widths averaged less than 2.0mm (Table 1). The samples measured *in situ* had 58-68 rings. All but I1 had average ring widths of at least 2.0mm; in addition their ring patterns showed little year-to-year variation in width (a feature known as "complacency"). None of the samples had sapwood although the outer edges of some timbers were at or near to heartwood-sapwood boundary.

Comparison of the tree-ring graphs showed no similarities between them. The lack of matching was confirmed by the computer comparisons. When the individuals ring sequences were tested against dated reference chronologies covering the period AD404 to the present day, no consistent results were found.

Without knowing the provenance of the timbers, it is impossible to determine why the Hatherleigh timbers do not date. Difficulties in dating Devon timbers have already been noted by several dendrochronologists (see Mills 1988 for a review of tree-ring work in Devon). Lack of reference material is not a problem as there are now many regional tree-ring chronologies for England including several from Devon. The relative shortness and complacency of the ring patterns as well as the lack of relative dating must be contributary reasons for the timbers not dating although other local environmental factors are also likely to be involved.

Acknowledgements

The work was funded by English Heritage. We are also grateful to Ian Tyers for unpublished computer software.

References

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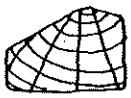
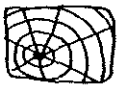
Table 1: Details of the tree-ring samples; plans of the spire and drawings of the timbers can be found in Westcott (1991). H/S - heartwood-sapwood transition; cross-sectional sketch is not to scale.

no	timber	total no of rings	sapwood rings	average ring width (mm)	sketch	cross-section dimensions (mm)	comments
BASE PLATFORM							
A3	western north-south beam	58	-	3.80		245x170	measured in situ
A6	central east-west beam	105	near H/S	1.41	-	-	core
A7	south quarter beam	68	-	2.01		315x195	measured in situ
A9	north-west corner brace	61	H/S	2.90		315x210	measured in situ
A11	south-east corner brace	59	-	3.27		320x210	measured in situ, knotty
PLATFORM 1							
I1	outer brace	66	H/S?	1.62		135x115	measured in situ
SPIRE RAFTERS							
SR1	spire rafter	76	-	1.69	-	-	core