

Ancient Monuments Laboratory
Report 49/91

TREE-RING ANALYSIS OF OAK TIMBERS
FROM THE ROADFORD RESERVOIR PROJECT
DEVON

Miss Jennifer Hillam

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Summary

Twelve oak timbers were sampled from various sites during the Roadford Reservoir Archaeology Project by the Exeter Archaeological Field unit. Some of the samples were prehistoric in date; others were medieval or later. Tree-ring analysis produced no dates, either relative or absolute.

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The Roadford Reservoir Archaeology Project carried out by Exeter Archaeological Field Unit is recording the palaeoenvironment and history of the valley due to be flooded by the new reservoir. During recording, a number of waterlogged prehistoric timbers were found as well as timbers from sites of medieval or later date. Twelve oak timbers were sampled for tree-ring analysis. They were examined in the Sheffield Dendrochronology Laboratory in 1990/1.

Three waterlogged timbers were sampled from soil pit 18 and one from the silts within the prehistoric river gravels (Table 1, D01-D04). They were all thought to be prehistoric in date, although there was a possibility that they could be later. The Hennard Mill site produced three samples of medieval or later date (D05-D07); two were from the waterwheel and the third was a plank from the launder. Shop Farm produced two dry samples of lintel also of medieval or later date (D10-D11). A sample was submitted from context 956, the construction of the fulling mill (D08). The remaining two waterlogged samples were from beneath the peat deposit and thought to be prehistoric in date. One was from peat section 49 (D09); the other was from transect 1003 (D12). A radiocarbon date of about 2500bc was obtained from the bottom of a peat profile similar to the one in which the wood was found (Straker pers comm).

Methods

The waterlogged samples were prepared by freezing them for at least 48 hours and then cleaning their cross-sections with a surform plane. The cross-sections of the dry samples were polished with a sander. The ring widths of those samples with more than 50 rings were measured on a travelling stage connected to an Apple II microcomputer (Hillam 1985, Fig 4). Ring patterns

with less than 50 rings are unlikely to be unique and might not produce reliable dates - see Hillam *et al* 1987 for further details. The 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. For crossmatching purposes, the ring width data were also transferred to an Atari ST microcomputer with hard disk. The tree-ring software for the Atari was written and developed by Ian Tyers (pers comm 1990). 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 site or structure, 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 date in which the tree was felled. A complete outer ring indicates that the tree was felled during its dormant period in winter or early spring. This is referred to as "winter felled". If the ring is incomplete, felling took place during the growing season in late spring or summer (referred to as "summer 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

Full details of the samples are given in Table 1. Four samples were rejected because they had less than 50 rings (D02, D05, D06, D10). The remainder had 59 to 171 rings. Some of the samples of probable prehistoric date were difficult to measure because their rings were knotty and unclear. D04, for example, was particularly difficult and some of its inner and outer rings remain unmeasured (Table 1); D12 had bands of very narrow rings.

Ring sequences from the same context were first compared against each other for similarity before being tested against sequences which might be of similar date. No relative dating was found.

The ring sequences were next tested against dated reference chronologies. Samples of possible prehistoric date were compared against all the available dated chronologies from England and Ireland. The Irish chronology spans the period 5289BC to the present (Brown et al 1986). English chronologies include those from County Durham, East Anglia and Lancashire (Baillie & Brown 1988) plus others from Humberside (Hillam & Groves unpubl). No reliable dating was found. All the ring sequences were tested against the many chronologies of historic date, but again no consistent results were obtained. One of the Shop Farm sequences (D11) gave tentative matches at three positions but visual matching failed to confirm any of the matches. This sample which has only 59 rings is probably undatable.

There are several reasons why the samples remain undated. The primary one must be the absence of a replicated site chronology for the site. Other reasons are lack of dated prehistoric chronologies for south-west England and the poor quality of the Roadford samples themselves.

The ring width data are stored in the Sheffield Dendrochronology Laboratory where they can be consulted. The data will be tested against new reference chronologies as they become available. It is therefore possible that the prehistoric timbers will be dated some time in the future.




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Table 1: Details of the tree-ring samples. Unmeasured rings are indicated by "+".

no	context	total no of rings	sapwood rings	average ring width (mm)	sketch	dimensions (mm)	comments
D01	14	78	-	1.9		195x150	soil pit 18; difficult to measure
D02	14	29	3	-		200x115	soil pit 18; insufficient rings
D03	14	85	-	1.2		125x115	soil pit 18
D04	391	+125+	-	1.6		295x270	wood from silts within prehistoric river channel, above river gravel; difficult to measure
D05	458	35	-	-		215x25	Hennard Mill; wood from waterwheel; insufficient rings
D06	458	38	-	-		200x25	Hennard Mill; wood from waterwheel; insufficient rings
D07	082	62	-	2.2		210x50	Hennard Mill; plank, possibly from launder associated with wheel pit; knotty
D08	956	+70	25	1.0		190x90	wood from fulling mill construction
D09	-	171	-	1.1		335x180	overlying silts, beneath peat deposit in peat section 49
D10	-	43	14	-		265x135	lintel from shop Farm - elevation 134; bark edge present; insufficient rings
D11	-	60	21	2.1		185x110	lintel from Shop Farm - elevation 129; timber felled summer
D12	-	146	-	1.2		180x170	wood from transect 1003 underlying peat deposit; difficult to measure