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Summary

A pilot tree-ring study was carried out on six oak timbers from the eroding beach at Wootton Creek. Radiocarbon analyses were also undertaken to provide an approximate date for four of the timbers. Absolute dating was achieved for two Neolithic timbers, one of which was felled in 2777/6BC. The radiocarbon results indicate that trees dating to approximately 2000BC were also present on the beach.

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Introduction

The eroding beach is situated on the eastern side of the mouth of Wootton Creek (NGR SZ559932) and consists of a steeply sloping storm beach some 3 metres high and mud flats extending about 200 metres to extreme low water. Peat beds, some of which are thought to be Mesolithic in date, are exposed on the mud flats in several places. Finds from most periods have been found on the beach including tranchet axes, burned flint, arrowheads, a pot beaker and pottery.

Large amounts of wood have been found, much of which has only become visible in the past four years. The site (code 1526) is covered by hundreds of wooden stakes, some in alignments. Post-medieval oyster beds and a Monastic fish pond are two possible explanations for at least some of the posts. Larger timbers were also discovered. These were thought to be fallen trees until it was noticed that one of them was held in position by driven stakes. Other timbers have pointed ends and may have formed some kind of revetment along the east bank of the channel.

Access to the site is limited to daylight spring tides. On 20 September 1989, as part of a pilot survey programme by the County Archaeology Unit under David Motkin, tree-ring samples were taken from six oak timbers in the hope that they would provide dates for some of the features. The following timbers were sampled:

182 A post which was one of many *in situ* posts in the intertidal zone west of 602; function and period unknown.

263 This post is the largest in a line of four which runs 1.7m east of the edge of the silted channel; the posts are set upright in clay in the intertidal zone. The posts may be associated with the revetment containing 604.

602 A log which was lying pegged down on the eroding beach, partially embedded in silt in the intertidal zone. The visible part of the log was 6.3m long. It was sampled to date the activity on that part of the beach.

603 A log lying on the eroding beach, partially embedded in silt in the intertidal zone; in a similar location to 602.

604 A pointed timber lying horizontally in the silted channel in an area which had yielded material from the late Neolithic onwards. The timber was one of a group which appears to be the remains of a collapsed revetment at the edge of the channel. It was unique in having the impression of a timber beam and peg on its surface.

605 A log or branch lying roughly north-south in the silty mud near the foot of the storm beach.

The tree-ring analysis was carried out in three stages. First, the initial analysis and relative dating was undertaken in 1989. Second, samples from four of the samples were submitted to the Belfast Radiocarbon Dating Laboratory in 1990. Finally, further analysis and some absolute dating was done in 1990/91 once the radiocarbon results had been obtained.

Methods

The larger samples were spilt radially into segments for ease of handling. Care was taken not to damage the bark impression on 604 which was later returned to the Isle of Wight for conservation. The samples were prepared by freezing them for at least 48 hours and then cleaning their cross-sections with a surform plane. The ring widths were measured on a travelling stage connected to an Apple II microcomputer (Hillam 1985, Fig 4) and 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

1. Initial analysis.

182 and 263 both had extremely narrow rings (Table 1). A sequence of 83 rings from the inner part of the sample was measured on 182, leaving about 83-86

unmeasured rings between the outer measured ring and the bark. The outer 58 rings were measured on 263; it was impossible to determine how many inner rings remained unmeasured. 602 produced a ring sequence of 283 rings and 603 one of 317 rings. The outer 217 rings on 604 were measured, the inner rings being too narrow for accurate measurement. 605 had much wider rings averaging 2.5mm and contained only 76 rings.

When the ring sequences of the six samples were tested against each other, a match was found between 602 and 604 which gave a t value of 6.2. Visual comparison of the graphs confirmed that the match was acceptable, and the ring widths from the two sequences were averaged to give a 331-year master sequence. No other relative dating was achieved.

The ring sequences were compared with dated reference chronologies from all periods. There was no match with any of the numerous chronolgies from the historic period. The prehistoric chronologies are relatively few in number (Table 2), and no reliable dating was obtained. A note was made of the positions of possible matches.

2. Radiocarbon dating.

Sections were cut from 182, 263, 602 and 603. At Belfast, samples were taken across the rings so that the resulting radiocarbon dates are representative of the complete ring sequences. The results are summarised in Table 3. 182, 263 and 603 are similar in date and from the 2 sigma calibrated dates, the timbers could be contemporary. They date very approximately to 2000 calBC. 602 is considerably older with a radiocarbon date of around 3000 calBC. The difference in date of almost 1000 years between 602 and 603 was unexepcted because stratigraphically the two timbers had appeared broadly contemporary.

3. Absolute dating.

The tentative tree-ring matches were rechecked in the light of the radiocarbon results. Consistently high t values were found for the 602/604 master over the period 3059-2729BC with chronologies from Nottinghamshire, Lancashire and East Anglia (Table 4). The individual ring sequences from 602 and 604 also gave good t values over this period, and the matches were confirmed by checking the similarity between the graphs.

The ring sequence of 602 spans the period 3059-2777BC. The tree started growing just before 3059, and died or was felled in 2777/6BC. 604 has a ring sequence spanning 2945-2729BC but the inner rings of the tree were unmeasurable and sapwood was not present. It was felled or died some time after 2719BC which makes it more recent than 602.

A tentative date was found for the 83-year ring sequence from 182. A t value of 5.7 was obtained between it and the East Anglia chronology over the period 1922-1840BC. It also gave a t value of 3.0 with the Belfast long chronology at this position. However the match was not confirmed by the Lancashire or Nottinghamshire chronologies and it is felt that further proof is needed before the tree-ring match can be accepted without reservation. If it were correct, a felling date of 1757-4BC would be obtained.

No match was found for 283, 603 or 605. Both 283 and 605 have relatively short ring sequences and these samples are probably undatable by dendrochronology. It is surprising however that the 317-year sequence from 603 remains undated.

Conclusion

The study has identified at least two broad periods of activity. 602 was felled or died in 2777/6BC and 604 some time after 2719BC. Timbers 182, 263 and 603 are younger by almost 1000 years even though stratigraphically 603 and

604 appear similar in date. The tree-ring dating of 602/604 to 3059-2729 is encouraging because the few prehistoric chronologies which are available at present are based on regions many miles distant from the Isle of Wight. The 331-year sequence will be a useful addition to the database of prehistoric chronologies. The study has therefore proved successful in two respects: archaeologically in providing absolute dates for two of the timbers and radiocarbon dates for some of the others, and dendrochronologically in providing new reference data. From both points of view, the analysis of a larger number of samples from Wootton Creek could prove very rewarding.

Acknowledgements

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Table 1: Details of the tree-ring samples. Sketches are not to scale; shading on the sketches indicates sapwood; unmeasured rings are indicated by "+".

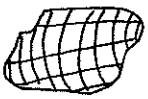
timber	total no of rings	sapwood rings	average ring width (mm)	sketch	dimensions (mm)	comments
182	+83+	24	0.53		250x160	rings mostly too narrow; about 83-6 to bark
263	+58	56	0.43		180x165	inner rings too narrow; felled summer
602	283	26	1.77		530x530	bark edge
603	317+	22+	0.62		400x400	about 13 rings to bark
604	+217	-	0.75		490x340	inner rings too narrow
605	76	-	2.46		220x200	

Table 2: Details of dated prehistoric tree-ring chronologies from Britain. Those marked with an asterisk were produced in the Belfast Tree-Ring Laboratory (eg Baillie & Brown 1988; Brown *et al* 1986); the remainder were produced at Sheffield (eg Hillam *et al* 1990).

Region	Chronology	Date span (BC)
Durham	Swan Carr*	1155-381
East Anglia	East Anglia*	3196-1681
Gloucestershire	Woolaston submerged forest 6/7	4096-3869
Humberside	Beverley Long Lane	4197-3891
	Hasholme logboat	699-323
	Hasholme bog oaks	1687-1326
	Watton Carrs 1	1804-1655
Lancashire	Ashton*	4307-4023
	Balls Farm*	4433-4165
	Croston Moss 1*	3198-1682
	Croston Moss 2*	1584-970
	Eskham House Farm*	3601-3109
	Hill Farm 1*	3807-3494
	Hill Farm 2*	3519-3283
	Lancs 2*	4989-4569
Lincolnshire	Fiskerton	505-339
Northern Ireland	Belfast long chronology*	5289-AD1983
Nottinghamshire	Colwick Hall 1*	3045-2697
	Colwick Hall 2*	2792-2583
	Old Loop 1*	4186-3833
	Old Loop 2*	4852-4426
	Para Trent 1	2563-2258
Somerset	Stolford submerged forest*	4050-3779
	Sweet Track	4202-3807

Table 3: Summary of the radiocarbon and tree-ring dates. The calibrated dates have been summarised from those provided by the Belfast Radiocarbon Laboratory.

timber	lab code	uncalibrated date (BP)	calibrated - 2 sigma (cal BC)	tree-ring date (BC)	felled (BC)
182	UB3271	3528+/-37	1970-1750	-	-
263	UB3272	3640+/-38	2135-1910	-	-
602	UB3273	4357+/-39	3095-2910	3059-2777	2777/6
603	UB3274	3681+/-38	2195-1960	-	-
604	-	-	-	2945-2729	2719+
605	-	-	-	-	-

Table 4: Dating 602 and 604. t values with dated chronologies.

chronology	602	604	602/604
Colwick Hall, Notts	4.8	2.5	4.3
Croston 1, Lancs	2.9	3.4	3.8
East Anglia	4.8	3.5	5.1