Ancient Monuments Laboratory
Report 86/93

TREE-RING DATING OF OAK TIMBERS
FROM SITE C, SKINNER'S WOOD,
SOMERSET

Jennifer Hillam

Ancient Monuments Laboratory Report 86/93

TREE-RING DATING OF OAK TIMBERS
FROM SITE C, SKINNER'S WOOD,
SOMERSET

Jennifer Hillam

Summary

Tree-ring analysis of four oak timbers from Site C
(track 3), resulted in a dated tree-ring chronology for
the period 1162-1003BC. The timbers were felled some
time after 993BC, making them broadly contemporary with
timbers from Caldicot and Goldcliff in Gwent, and Flag
Fen and Fengate in Cambridgeshire.

Author's address :-

Jennifer Hillam

Department of Archaeology & Prehistory
University of Sheffield
Sheffield
S10 2TN

TREE-RING DATING OF OAK TIMBERS FROM SITE C, SKINNER'S WOOD, SOMERSET

Wood samples from three trackways at Skinner's Wood (NGR ST413401) were submitted for assessment as to their dendrochronological potential. Most of the samples were unsuitable for dating purposes since they were small pieces of wood, often roundwood, with well under 50 rings, the minimum number usually required for reliable dating (Hillam et al 1987). However, four pieces of split oak (Quercus spp) from track 3, Site C, appeared to have more than 50 rings. These were examined in February 1993.

Track 3 consisted of a jumble of brushwood with which split timbers were associated. The split timbers were mostly oak, although some ash planks were also found. At least some of the split timbers were thought to be reused (Horner pers comm). An ash peg from the Skinner's Wood sites to the north (Coles & Orme 1978) has a radiocarbon date of 900-770calBC (HAR-650 - see Coles & Dobson 1989), but there are no radiocarbon dates for the present sites. Tree-ring dating was therefore undertaken to provide a precise date for the split oak timbers from track 3.

Methods

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 to an accuracy of 0.01mm on a travelling stage which is connected to an Atari microcomputer. The Atari uses a suite of dendrochronology programs written by Ian Tyers (pers comm 1992). The measured ring sequences were plotted as graphs using an Epson HI-80 plotter, also connected to the Atari. Crossmatching was carried out first visually by comparing the graphs on a light box, and then using a computer program to measure the amount of correlation between two ring sequences. 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). A value greater than 10 is taken to indicate an origin in the same tree. Comparisons of sequences from different trees rarely produce t values above 10, although ring sequences from the same tree sometimes give values less than 10.

Dating is achieved by averaging the data from the matching sequences to produce a site master curve, 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. All potential tree-ring dates are then checked by examining the quality of the visual match between the graphs.

If a sample has bark or bark edge, the date of the last measured ring is the date 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 lost.

Results
Although they were small, the four radially split oak planks had 79-143 heartwood rings; none of them had sapwood (Table 1). They had relatively narrow rings with average ring widths of about 1.0mm, suggesting an origin in closed woodland. Their ring patterns were all similar, particularly those from 166 and 214, two timbers found some distance apart (Table 2). The latter gave a t value of 11.1, which indicates that the timbers were probably split from the same tree. The ring widths of 166 and 214 were

averaged to produce a single ring sequence. This was then combined with the ring widths from 165 and 167 to construct a site master curve of 160 years (Table 3).

When the master was tested against dated reference chronologies, a potential match was found with several chronologies over the period 1162-1003BC (Table 4). Examination of the visual matches confirmed this result.

The dates of the last measured ring vary from 1020BC to 1003BC (Table 1), suggesting that the four dated timbers are broadly contemporary and that possibly only the sapwood rings are missing (Fig 1). Allowing for a minimum of 10 missing sapwood rings, it is unlikely that the timbers were felled before 993BC. If few or no heartwood rings were removed during preparation of the timbers, they were probably felled before about 948BC. Since the timbers may be reused, the construction of track 3 could be towards the end of this date range, or possibly even more recent, which would agree with the radiocarbon evidence.

No match was found between the Skinner's Wood chronology and the chronologies from the Meare Heath track and Tinney's Ground, two other LBA trackways from the Somerset Levels, suggesting that these might be older in date than Skinner's Wood (see also Coles & Coles 1992). On the other hand, the timbers from Skinner's Wood are broadly contemporary with timbers from other Bronze Age sites (Fig 2). Oak and ash timbers from Caldicot Castle Lake in Gwent have felling dates early in the first millennium BC, as do the remains of a boat from Goldcliff, also in Gwent. Some of the oak timbers from the timber platform at Flag Fen in Cambridgeshire, and the nearby Fengate post alignment, also cluster around the same date. Tree-ring dating therefore has not only provided a date for the oak timbers from track 3 at Skinner's Wood site C, it has also linked the site temporally with other LBA sites in England and Wales.

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.

Brown DM, Munro MAR, Baillie MGL & Pilcher JR 1986 Dendro-chronology - the absolute Irish standard. *Radiocarbon* 28 (2A), 279-83.

Coles B & Coles J 1992 Passages of time, *Archäologische Mitteilungen aus Nordwestdeutschland* 15, 29-44.

Coles JM & Dobson MJ 1989 Calibration of radiocarbon dates from the Somerset Levels, *Somerset Levels Papers* 15,67.

Coles JM & Orme BJ 1978 Bronze Age implements from Skinner's Wood, Shapwick, *Somerset Levels Papers* 4, 114-121.

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.

Munro MAR 1984 An improved algorithm for crossdating tree-ring series, *Tree Ring Bulletin* 44, 17-27.

Neve J 1992 An interim report on the dendrochronology of Flag Fen and Fengate, *Antiquity* 66, 470-75.
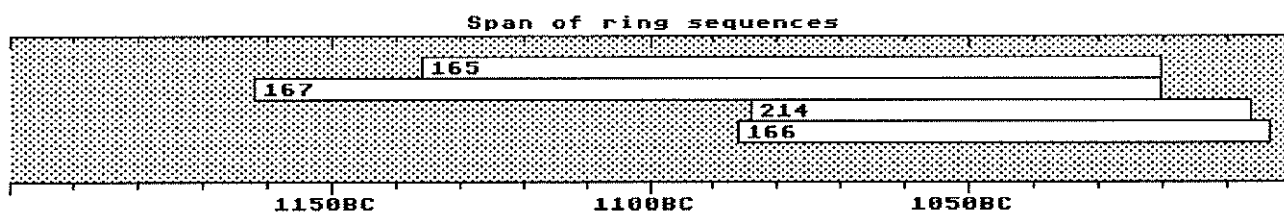
Fig 1: Bar diagram showing the relative positions of the matching ring sequences from Skinner's Wood.
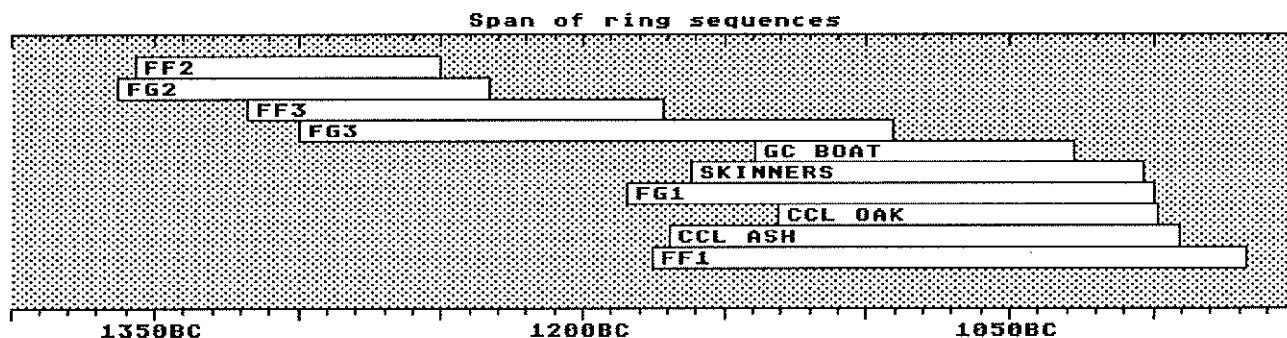

Fig 2: Bar diagram showing the temporal relationship of the Skinner's Wood chronology to those from other LBA sites. CCL - Caldicot Castle Lake, Gwent; FF/FG - Flag Fen/Fengate, Cambridgeshire; GC - Goldcliff, Gwent.

Table 1: Details of the tree-ring samples. None of the timbers had sapwood; sketches are not to scale. All dates are BC.
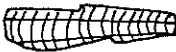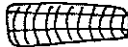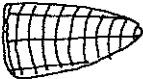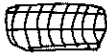
sample no.	total rings	av. ring width (mm)	sketch	dimensions (mm)	date span of rings	felled
165	117	1.06		125x35	1136-1020	1010+
166	84	0.97		90x30	1086-1003	993+
167	143	0.79		140x90	1162-1020	1010+
214	79	0.98		80x45	1084-1006	996+

Table 2: *t* value matrix showing the level of agreement between the matching ring sequences.

	165	166	167	214
165	*	7.4	5.2	8.7
166		*	3.7	11.1
167			*	4.4
214				*

Table 3: Skinner's Wood chronology, 1162-1003BC.

	ring widths (0.01mm)										no. of samples									
1162BC									154	63	1	1								
	152	120	94	185	127	115	161	140	133	99	1	1	1	1	1	1	1	1	1	1
1150BC	211	156	201	183	174	142	151	162	211	158	1	1	1	1	1	1	1	1	1	1
	116	142	90	128	134	163	170	134	186	178	1	1	1	1	2	2	2	2	2	2
	142	107	126	98	165	145	121	122	157	123	2	2	2	2	2	2	2	2	2	2
	93	64	87	86	73	87	98	109	94	70	2	2	2	2	2	2	2	2	2	2
	98	83	82	48	68	89	89	88	119	81	2	2	2	2	2	2	2	2	2	2
1100BC	77	99	88	84	70	85	64	95	84	69	2	2	2	2	2	2	2	2	2	2
	98	106	66	78	102	80	91	87	112	82	2	2	2	2	3	3	3	3	3	3
	82	104	79	60	103	73	86	71	79	90	3	3	3	3	3	3	3	3	3	3
	70	72	90	87	70	68	78	82	71	92	3	3	3	3	3	3	3	3	3	3
	98	65	80	75	53	56	74	100	75	88	3	3	3	3	3	3	3	3	3	3
1050BC	99	65	56	57	53	85	61	95	89	66	3	3	3	3	3	3	3	3	3	3
	80	50	48	72	84	101	80	100	79	84	3	3	3	3	3	3	3	3	3	3
	59	59	80	91	98	91	115	68	92	77	3	3	3	3	3	3	3	3	3	3
	93	124	123	150	128	138	187	129	93	61	3	1	1	1	1	1	1	1	1	1
	150	165	118	114	96	133	153	126			1	1	1	1	1	1	1	1		

Table 4: Dating the Skinner's Wood chronology. *t* values with dated reference chronologies (those less than 3.0 are not printed).

chronology	*t* value with: master	165	166/214	167
Belfast long chronology (Brown et al 1986)			3.9	
Caldicot oak chronology (Hillam unpubl)	3.0		4.6	
Croston 2, Lancs (Baillie & Brown pers comm)		3.8	3.6	
Flag Fen/Fengate, Cambs (Neve 1992)	5.6	4.3	5.3	5.2
Germany (Becker pers comm)	3.8			
Goldcliff boat (Hillam unpubl)	3.6			
Rookhall, Essex (Hillam unpubl)	3.1			3.3
Swan Carr, Co Durham (Brown et al 1986)		3.4		