ANCIENT MONUMENTS LABORATORY

REPORT

4167

SERIES/No CONTRACTOR

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TITLE Dendrochronology; Hamwih, Six Dials 1981

Hamwih, Six Dials 1981

Dendrochronology

by Jennifer Hillam, Jan'84

Summary: Timbers from Hamwih, Six Dials 1981, were dated by dendrochronology to give a site tree-ring chronology covering the period AD 458-710. All but one of the timbers were felled in AD 709±9; the latter was felled some time after AD 733.

Twelve oak timbers, dated by associated finds to about the 7th century, were examined at the DoE Dendrochronology Laboratory in 1983. They had 80 to 238 annual rings. Six samples (14, 22, 28, 29, 32, 33) had sapwood preserved (Table 1), and sample 14 retained its full sapwood complement plus the bark. Unfortunately, the bark was detached from the rest of the timber, and the outer 3-5 sapwood rings were too damaged for measurement.

Visual examination of the tree-ring plots showed that some of them were almost identical. These were 22, 28 and 29; 15 and 32; and 24 and 26. Computer comparisons confirmed that the level of agreement within these three groups was very high. For example:

15 versus 32	t = 19.6
24 versus 26	t = 12.4
22 versus 28	t = 30.6

Values of 3.5 and over are considered significant provided that the visual match is acceptable (Baillie & Pilcher, 1973), so the above t-values are exceptionally high, and must

indicate that the timbers in each group come from the same tree. The correlations between samples 22, 28 and 29 in particular are so high that the three timbers were probably cut from the same length of radially-split timber. This is supported by the dimensions of the timbers which are very similar (Table 1).

The ring patterns of all the Hamwih timbers except sample 14 crossmatched (Fig 1). A site master curve of 253 years was constructed. The data from all the matching sequences were included but those from 22, 28, 29; 15, 32; and 24, 26 were first meaned so as not to bias the master curve. The master was compared with two dated reference chronologies: Ref 8 (Fletcher, 1977), made up from timbers from Old Windsor and Portchester, and Tamworth (Baillie, pers.comm.). Agreement values of 9.5 and 4.0 respectively were obtained when the Hamwih sequence covered the period AD 458-710.

The dates of the individual samples (Table 1; Fig 1) show that all the timbers, except 12 and perhaps 13, are contemporary. Their felling date was obtained by adding 32±9 years, the estimated number of sapwood rings in oak (Baillie, 1982; see also Hughes *et al*, 1981, for a general discussion of oak sapwood rings), to the date of the mean heartwood-sapwood transition. An estimated felling date of AD 709±9 was thus found. Timber 12 was felled some time later since its outer heartwood ring is dated to AD 710, and none of its sapwood remained. The *terminus post quem* for its date of felling is therefore AD 733. The outer ring of sample 13 is AD 555, but the timber may have been split from the inner part of a tree and the outer part used for

timber 33 or a similar timber (Fig 1). It should be noted that timber 24 was broken at the rings dated to AD 554/5.

Sample 14 remains undated which is unfortunate since it would have provided a felling date accurate to within one or two years because of its complete sapwood. Not only did its ring pattern not match with the other Hamwih sequences, but also no match was found between it and the reference chronologies. The ring width data from 14 and the other Hamwih samples are available from the author at the DoE Dendrochronology Laboratory; the master chronology is presented in Table 3.

Acknowledgements

The work was financed by the Ancient Monuments Branch of the Department of the Environment.

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.

Fletcher JM 1977 Tree-ring chronologies for the 6th to 16th centuries for oaks of southern and eastern England, J Archaeol Science 4, 335-52.

Hughes MK, Milsom SJ & Leggett PA 1981 Sapwood estimates in the interpretation of tree-ring dates, J Archaeol Science 8, 381-90.

Fig 1: Hamwih bar diagram. Relative positions of the matching ring sequences; sapwood rings are shown by hatching.

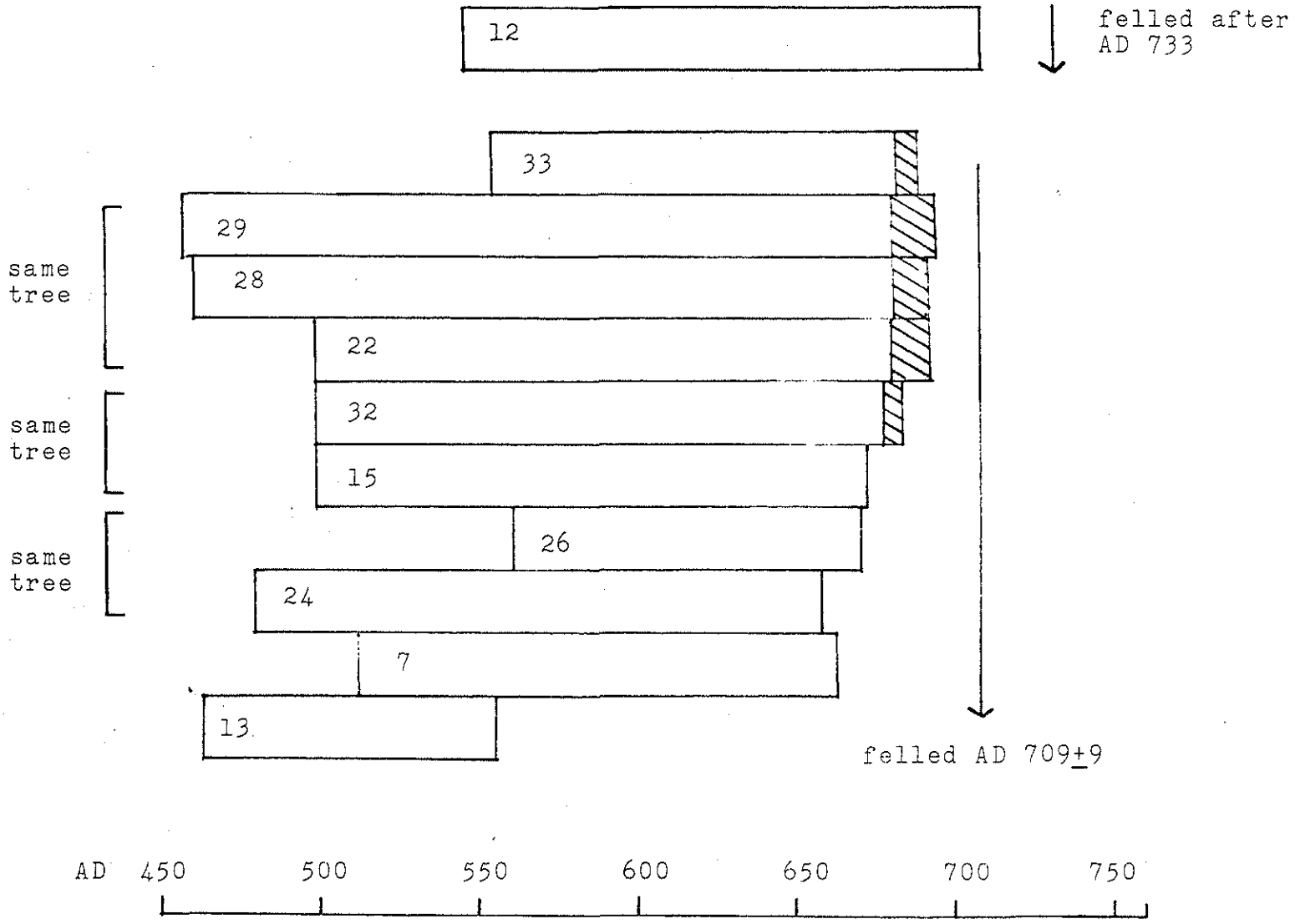


Table 1: Details of the timbers. Sketches are not to scale.

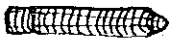
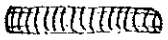
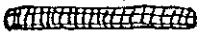
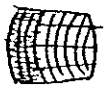
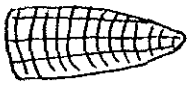
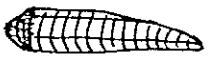
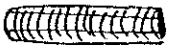
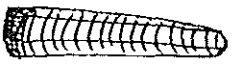
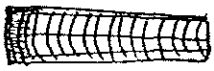
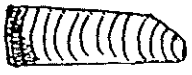
sample no	total no of rings	sapwood rings	sketch	maximum dimensions (mm)
7	152	-		230 x 70
12	164	-		160 x 35
13	93	-		215 x 25
14	80	37+3-5		95 x 70
15	175	-		180 x 60
22	195	13		240 x 50
24	180	-		250 x 40
26	111	-		170 x 25
28	233	12		290 x 50
29	238	14		295 x 50
32	186	6		200 x 65
33	136	8		195 x 50

Table 2: Summary of tree-ring dates and agreement values (t). The date of the heartwood-sapwood transition is given in brackets.

sample no	date span (AD)	t-value with 29	t-value with Ref 8
7	512-663	4.4	6.0
12	547-710	8.4	6.6
13	463-555	5.2	3.7
15	499-673	6.3	3.4
22	499-693 (681)	27.5	5.8
24	480-659	6.8	4.8
26	561-671	4.3	3.1
28	461-693 (682)	34.3	8.4
29	458-695 (682)	-	7.9
32	499-684 (679)	6.2	2.7
33	555-690 (683)	8.7	7.3
Master curve	458-710	-	9.5

Table 3: Hamwih tree-ring chronology, AD 458-710.

year	ring widths (0.02mm)									
	0	1	2	3	4	5	6	7	8	9
458									99	90
460	67	76	65	88	76	82	185	151	166	101
470	74	78	109	123	99	77	94	82	130	93
480	94	72	93	113	121	88	107	69	65	56
490	49	80	51	89	118	119	72	53	63	92
500	111	97	82	61	76	100	78	84	119	120
510	136	98	86	69	116	136	115	89	73	67
520	73	81	92	77	113	80	87	91	70	72
530	84	117	96	102	89	68	61	56	62	50
540	48	47	79	87	95	64	70	58	55	70
550	99	50	84	76	55	58	51	49	68	86
560	65	59	46	33	38	38	58	74	66	78
570	81	51	36	37	64	52	44	61	77	81
580	64	69	77	67	59	56	68	55	50	51
590	59	58	51	78	53	45	48	49	46	72
600	65	70	67	45	36	55	65	75	60	57
610	64	65	55	48	65	48	44	40	43	39
620	37	49	54	77	61	65	63	44	64	44
630	40	55	49	56	55	45	71	70	55	45
640	41	41	45	48	40	57	57	69	60	72
650	69	54	57	63	51	46	54	58	65	58
660	65	58	63	76	43	67	62	69	54	67
670	48	46	49	54	57	42	51	47	53	41
680	39	55	43	42	43	49	61	51	46	49
690	38	44	48	42	30	42	28	36	20	38
700	52	42	39	45	57	54	48	36	31	30
710	28									