BRISTOL BRIDGE DENDROCHRONOLOGY

Analysis of the re-used boat timbers

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The ten re-used boat timbers from the Bristol Bridge excavations
were examined at the DoE Dendrochronology Laboratory in 1983,
and some preliminary results obtained. The samples were
remeasured in 1984, and the results of that study are
presented here.

The samples, all oak, had 82 to 154 annual growth
rings, the average widths of which were between 1.2 and 1.9mm
(Table 1). The exception was S7301 which had very narrow rings:
the 120 rings that were measured had an average width of 0.8mm,
but there were at least another 70 rings that were narrower
still, and could not be measured with any accuracy. None of
the samples had sapwood rings.

When the ring sequences were compared with each
other, S7298 and S7303 were found to be very similar. The t-
value for the match is 20.5. (Generally a t-value over 3.5 is
significant if it is accompanied by an acceptable visual
match - see Baillie, 1982, for a comprehensive guide to tree-
ring dating.) It seems probable therefore that timbers, S7298
and S7303, were split from the same tree. S7295 and S7296 also
crossmatched with each other (t = 6.7) and with S7298/7303.
The ring sequences of the other timbers did not appear to be
synchronous.

The ring width data were next compared with the following dated reference chronologies: Dublin (Baillie, 1977a); Ref6, which is made up from timbers from south-east England (Fletcher, 1977); Exeter (Hillam, 1980) and Belfast (Baillie, 1977b). All the ring sequences, except S7300 and S7301, crossmatched with at least two of these reference chronologies (Table 2). They all matched well with the Dublin chronology, but some of them matched equally well with Ref6 and Exeter. It is impossible to make any deductions about the provenance of the boat timbers using the t-values presented in Table 2. What is certain is that the timbers did not come from trees grown under similar conditions. The poor correlation between most of the individual sequences suggests that the timbers came from more than one woodland source.

A site master chronology was constructed using the data from six of the matching curves: S7295, S7297, S7299, S7298/7303, S7302 and S7304. S7298 and S7303 were included as one sequence so as not to bias the master. The chronology covers the period AD 1032-1239. Although most of the individual ring patterns do not appear to match with each other, the master curve matches with at least nine reference chronologies (Table 3). The timbers used to construct the reference chronologies came from as far away as Scotland (Baillie, 1977c) or the Munich area of Germany (Becker, 1981), although the best matches are with Dublin (t = 10.7) and Exeter (t = 9.2).

The unmatched sequences, S7300 and S7301, were tested against the master curve but did not match. They were

also tested against the two German chronologies (Becker, 1981;
Hollstein, 1980) in case the timbers had been imported from
the Continent, but again no significant match was found.

The dates of the outer rings varied from AD 1142
to AD 1239. In the absence of sapwood, a terminus post quem
was calculated for the felling date of each timber (Table 2).
The earliest timber, S7297, was felled some time after AD
1165, and the latest, S7298/7303, after AD 1261. (The number
of sapwood rings was taken as 32 ± 9 - Baillie, 1982. A survey
of sapwood estimates for oak is given in Hughes et al, 1981.)

The ring width data can be obtained from the
author at the DoE Dendrochronology Laboratory in Sheffield,
whilst the master chronology data are set out in Table 4.

Acknowledgements

References

Baillie MGL 1977a   Dublin Medieval Dendrochronology, Tree
    Ring Bulletin 37, 13-20.

----------- 1977b   The Belfast oak chronology to AD 1001,
    Tree Ring Bulletin 37, 1-12.

----------- 1977c   An oak chronology for South Central
    Scotland, Tree Ring Bulletin 37, 33-44.

----------- 1982   Tree-Ring Dating and Archaeology, London,
    Croom Helm.

Becker B 1981   Fällungsdaten Römischer Bauhölzer, <u>Fundberichte</u>
    <u>aus Baden-Württemberg</u> 6, 369-86.

Bridge M 1983   <u>The use of Tree-ring Widths as a Means of</u>
    <u>Dating Timbers from Historical Sites</u>, PhD Thesis,
    Portsmouth Polytechnic.

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

Hillam J 1980   A medieval oak tree-ring chronology from
    south-west England, <u>Tree Ring Bulletin</u> 40, 13-22.

Hollstein E 1980   <u>Mitteleuropaische Eichenchronologie</u>, Zabern,
    Mainz am Rhein.

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

Laxton RR, Litton CD, Simpson WG & Whitley PJ 1982   Tree-ring
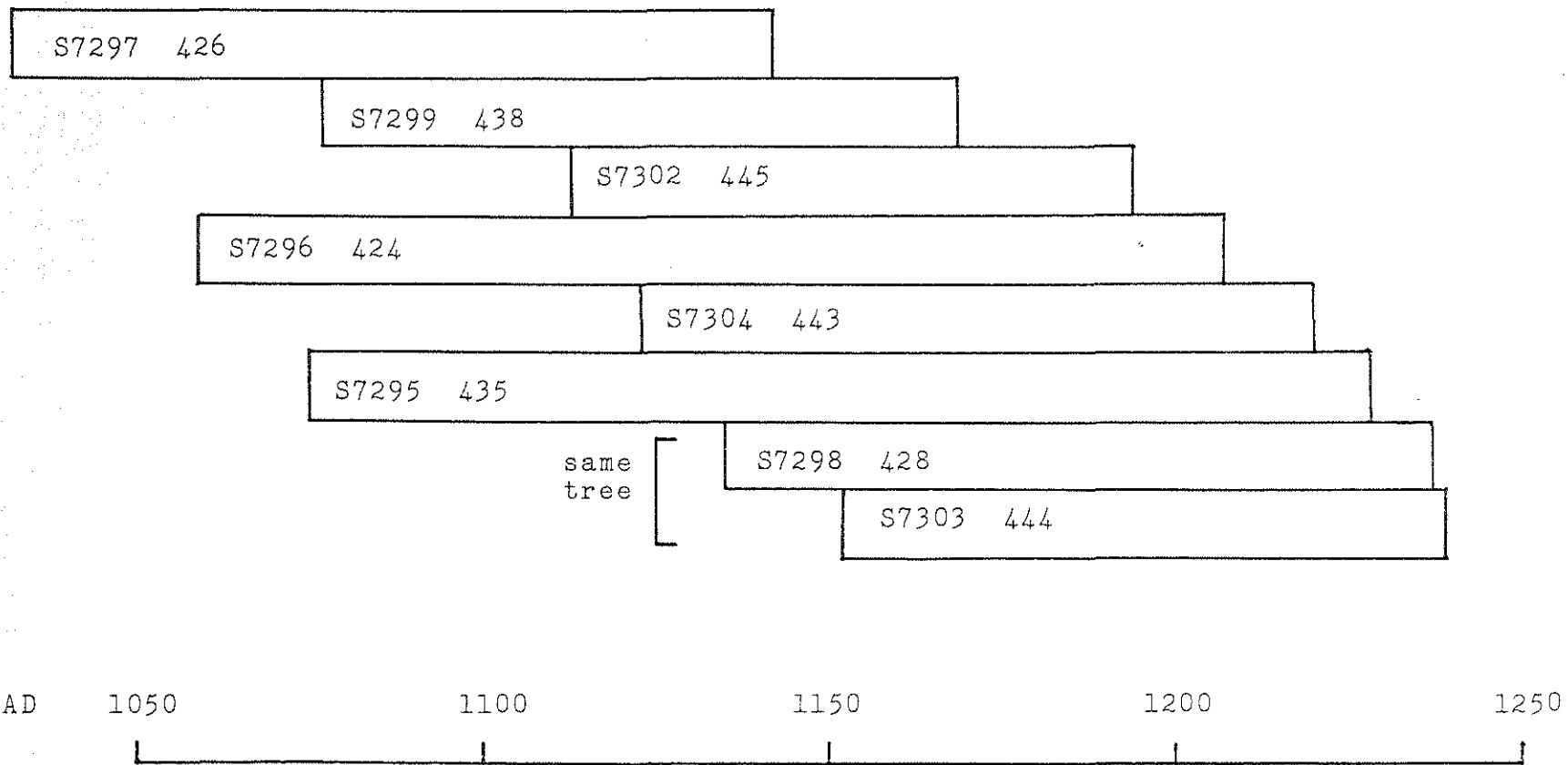   dates for some East Midland buildings, <u>Trans Thoroton Soc</u>
    86, 73-8.

Fig 1: Bar diagram showing relative positions of the ring sequences from the Bristol Bridge re-used boat timbers. The outer 14 rings of S7296 were not measured.

Table 1: Details of the timbers; sketches are not to scale. None of the timbers had sapwood.
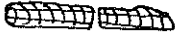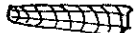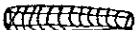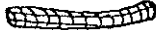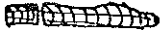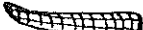
sample no (NMM)	timber no	total no of rings	average width(mm)	sketch	maximum dimensions (mm)
S7295	435	154	1.5		250 x 20
S7296	424	135+c.14	1.2		180 x 20
S7297	426	111	1.2		130 x 20
S7298	428	103	1.4		140 x 20
S7299	438	93	1.9		170 x 15
S7300	439	+84	1.6		160 x 20
S7301	440	120+	0.8		130 x 20
S7302	445	82	1.5		120 x 15
S7303	444	88	1.5		130 x 18
S7304	443	98	1.2		120 x 10

Table 2: Summary of tree-ring dates and agreement values ($\underline{t}$) of the individual samples. Reference chronologies are as in Table 3. $\underline{t}$-values less than 3.0 are indicated by a dash.

sample/timber no		date span (AD)	felled after	t-values Dublin	Ref6	Exeter	Belfast
S7295	435	1075-1228	1251	6.8	4.8	6.7	4.5
S7296	424	1059-1193+c.14	1230	5.1	3.8	5.2	5.0
S7297	426	1032-1142	1165	6.9	-	6.0	4.1
S7298	428	1135-1237	1261	4.7	5.7	-	-
S7299	438	1077-1169	1192	3.5	-	3.5	3.0
S7302	445	1113-1194	1217	4.0	4.9	3.2	3.1
S7303	444	1152-1239	1261	4.9	4.3	-	-
S7304	443	1123-1220	1243	5.9	-	3.6	-

Table 3:   Dating the master curve, AD1032-1239.

Reference chronology	t-value
Dublin (Baillie, 1977a)	10.7
Ref 6 (Fletcher, 1977)	4.9
Exeter (Hillam, 1980)	9.2
Belfast (Baillie, 1977b)	6.2
Germany, Trier area (Hollstein, 1980)	3.8
Germany, Munich area (Becker, 1981)	3.1
Glastonbury Abbey Barn (Bridge, 1983)	4.2
Lincoln Cathedral (Laxton et al, 1982)	5.1
Scotland (Baillie, 1977c)	6.0

Table 4:   Bristol Bridge re-used boat timbers. Master chronology, AD 1032-1239. Six ring sequences are included; S7298 and S7303 are represented as one sequence.

year	ring widths (0.02mm)										no. of sequences									
	0	1	2	3	4	5	6	7	8	9										
1032			52	60	71	86	61	74	77	64		1	1	1	1	1	1	1	1	
1040	82	55	63	58	46	55	60	75	58	74	1	1	1	1	1	1	1	1	1	1
1050	49	83	50	40	33	39	57	67	66	51	1	1	1	1	1	1	1	1	1	1
1060	70	57	49	41	34	30	37	44	60	50	1	1	1	1	1	1	1	1	1	1
1070	66	50	40	61	48	108	117	99	104	102	1	1	1	1	1	2	2	2	2	2
1080	80	63	64	64	49	84	61	67	68	54	2	2	2	2	2	2	2	2	2	2
1090	57	49	46	88	57	75	68	84	88	106	2	2	2	2	2	2	2	2	2	2
1100	70	53	53	73	61	62	68	62	77	55	2	2	2	2	2	2	2	2	2	2
1110	52	72	77	57	61	82	88	99	95	60	2	2	3	4	4	4	4	4	4	4
1120	75	69	62	57	57	78	69	71	93	56	4	4	4	5	5	5	5	5	5	5
1130	84	85	73	67	73	95	71	63	80	73	5	5	5	5	5	6	6	6	6	6
1140	75	81	87	59	62	79	78	71	70	74	6	6	6	5	5	5	5	5	5	5
1150	57	62	52	62	55	57	87	61	60	67	5	5	5	5	5	5	5	5	5	5
1160	67	55	59	65	73	64	60	56	68	70	5	5	5	5	5	5	5	5	5	5
1170	59	70	54	64	53	56	71	44	61	81	4	4	4	4	4	4	4	4	4	4
1180	55	58	82	59	48	54	56	64	40	59	4	4	4	4	4	4	4	4	4	4
1190	77	54	52	61	59	58	65	55	65	55	4	4	4	4	4	3	3	3	3	3
1200	44	51	68	81	50	63	69	46	52	49	3	3	3	3	3	3	3	3	3	3
1210	65	73	60	78	90	71	53	67	64	63	3	3	3	3	3	3	3	3	3	3
1220	61	79	78	87	69	76	90	58	83	59	3	2	2	2	2	2	2	2	2	1
1230	67	75	49	59	70	68	37	74	62	51	1	1	1	1	1	1	1	1	1	1