

## TREE-RING SPOT-DATES

Ian Tyers

(The cross-references denoted 'CQ' in this paper relate to *Charter Quay, The Spirit of Change*, Wessex Archaeology 2003)

A total of 18 samples from timber excavated at Charter Quay were submitted for spot-dating, of which nine had sufficient rings for attempting tree-ring dating. Standard dendrochronological methods were applied to the nine suitable samples (for details of methodology see e.g. English Heritage 1998). A summary of the results is provided below. It is important to appreciate that although the absolute chronological dates will not change, the interpretations of the results are of necessity interim and liable to change, particularly as aspects of re-use and repair are revealed by post-excavation analyses, and the undated material may be dated by new reference data at some point in the future.

Three types of dating result are usually obtained by dendrochronological analysis. Firstly, where a sample is complete to the bark-edge, a precise year of felling is obtained directly from the date of the last ring on the sample. Secondly, where a sample has some sapwood, but is not complete to the bark edge, a felling date range is obtained by applying the maximum and minimum numbers of rings of sapwood normally seen in English oaks to the relevant samples. A range of 10-46 is used throughout this report for local oak, this estimate being based on modern and excavated timbers from England (Tyers 1998). Finally where no sapwood survives, a terminus post quem (*tpq*) date is obtained by adding the minimum number of sapwood rings likely to have been lost to the date of the latest surviving ring. This type of date is very much less useful than the other two types, since a very great number of rings could have been lost either through ancient carpentry practice, or poor site preservation, and thus the felling date of such material may be considerably later than the tree-ring date.

### Results

Eighteen oak samples were submitted. Records supplied with the samples indicate that large quantities of non-oak timber (elm and softwoods) were also recovered from the site but only the oak was submitted for tree-ring spot-dating. Nine of the samples had sufficient rings for attempting tree-ring dating; the rest had insufficient rings for reliable cross-matching, or had bands of narrow rings that prevented reliable measurement of the sequence. A summary of the findings is presented in Table 1. A total of five samples were successfully cross-matched with each other and with externally dated site masters and regional chronologies (see CQ Fig. 14).

The dated material is derived from two separate structures and all the dated timbers appear to be originally early 13th century in date. The material suffers from the somewhat sparse survival of sapwood and bark on the samples, and the interpretation of the dates obtained is made more complex by the general absence of surviving bark-edge from more than one tree within any one structure. In addition, evidence from the excavations makes it clear that much of the material is re-used – waterfronts in the Thames generally exhibit high levels of re-use and ongoing repair making any tree-ring evidence difficult to interpret reliably in the absence of wood technological evidence.

A very brief summary of the findings for each dated structure is given here. There are a number of areas where additional feedback from the structural sequence and timber records may allow some refinement to the interpretations given here.

**Structure R1:** only two samples from the six submitted from this group of re-used timbers contained sufficient rings for analysis, and only one of these was datable by reference sequences. This sample contained no sapwood, and a date of after AD 1117 is indicated (see *CQ* p. 14).

**Structure R2:** five samples were submitted from this group of re-used building timbers; all were suitable for measurement, and four were dated by local reference sequences. The results indicate early 13th century material is present. The 5-year difference in felling dates for the only two samples that contained bark-edge (AD 1215/6 and AD 1220) appears to suggest that different structures of broadly similar date are present rather than a single re-used building (see *CQ* p. 19). These timbers were perhaps the result, therefore, of clearance of a group of tenements originally erected over a number of years. The reconstruction of the original buildings from which they derived would be of wider interest since few early 13th century urban buildings survive in England. The two dated samples without bark-edge are of similar date to those with bark-edge.

**Structure 1/2:** three samples from this group of re-used building timbers were submitted for analysis, but only one was suitable for measurement and this has not proven datable.

**Structure 1099:** one timber from this 16th or 17th century revetment was submitted for analysis, but did not have sufficient rings to attempt analysis.

**Structure 1100:** two timbers from this 18th century revetment were submitted for analysis, but only one had sufficient rings for analysis and this has not proven datable.

**Structure 1104:** one timber from this 14th century revetment was submitted for analysis, but this did not have sufficient rings to attempt analysis.

## References

- Baillie, M.G.L. and Plicher, J.R., 1973. A simple cross-dating program for tree-ring research, *Tree Ring Bulletin* **33**, 7-14
- English Heritage, 1998. *Guidelines on Producing and Interpreting Dendrochronological Dates*. London
- Tyers, I., 1998. *Tree-Ring analysis and wood identification of timbers excavated on the Magistrates Court Site, Kingston upon Hull, East Yorkshire*, ARCUS Rep **40**

**Table 1. Sample details from Charter Quay**

Sample	Group	Dimensions	Type	Rings	Sapwood and Bark	Growth Rate (mm/year)	Dates of sequence	Interpretation
123B	R1	-	-	-	-	-	Not measured	-
124B	R1	-	-	-	-	-	Not measured	-
125	R1	-	-	-	-	-	Not measured	-
126	R1	240 x 50	Oak	111	-	2.01	AD997-AD1107	after AD1117
131	R1	230 x 70	Oak	138	-	1.22	Not dated	-
148	R1	-	-	-	-	-	Not measured	-
129	R2	235 x 130	Oak	71	-	3.19	Not dated	-
130	R2	125 x 115	Oak	85	45+?b	1.01	AD1136-AD1220	AD1220?
132	R2	215 x 60	Oak	127	15+7	1.58	AD1071-AD1197	AD1204-28
133	R2	235 x 90	Oak	119	25+Bw	1.93	AD1097-AD1215	AD1215/6 winter
134	R2	300 x 55	Oak	158	h/s	1.84	AD1029-AD1186	AD1196-1232
120	R1/2	155 x 135	Oak	63	-	1.98	Not dated	-
128	R1/2	-	-	-	-	-	Not measured	-
242	R1/2	-	-	-	-	-	Not measured	-
75	1099	-	-	-	-	-	Not measured	-
73	1100	-	-	-	-	-	Not measured	-
244	1100	190 x 180	Oak	74	-	2.11	Not dated	-
69	1104	-	-	-	-	-	Not measured	-

**Key**

?b possible bark-edge

+7 italic numbers indicate unmeasured rings (these are usually too narrow to reliably measure) that are excluded from the total rings and average growth rate calculations, but are included in the interpretations.

Bw winter felled bark-edge

h/s heartwood/sapwood edge surviving on the outer surface of the timber

**Figure 2.** Bar diagram showing the relative and absolute positions of the matched samples from Charter Quay. White bars represent heartwood, hatched bars sapwood, narrow bars indicate unmeasured rings, the felling date ranges calculated for each timber is also shown (see *CQ* Fig. 14).

