ANL REPORT 4132

Hartlepool, Southgate 1982 - Tree-Ring Analysis

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Six oak timbers (493, 494, 622, 642, 643, 649) were examined at the DoE Dendrochronology Laboratory in 1982. The samples had 106 to 256 narrow annual growth rings (Table 1). The inner rings of 643 in particular were very narrow, and difficult to measure, and for this reason the first 100 rings were excluded from attempts to crossdate the ring sequence.

Sapwood was present on all the samples except 643, and possibly 649. (The outer four rings of 649 resembled sapwood but it was impossible to be certain.) 494 retained its full complement of sapwood rings and, as the last ring was complete, must have been felled in winter or early spring.

The ring widths were plotted as tree-ring curves on transparent semi-logarithmic paper so that the ring patterns could be tested against each other for similarity. (A general discussion of tree-ring dating can be found in Baillie, 1982, and Hillam, 1979.) 493, 494, 642 and 643 crossmatched (Fig. 1) to give a total sequence of 362 years (262 years if the first 100 rings of 643 are excluded). When the ring sequences were compared using the Belfast computer program (Baillie & Pilcher, 1973), t-values between 6 and 13 were obtained; some of these are set out in Table 2 . The t-values indicate a high level of agreement, particularly for

the comparison between 642 and 643 which gives a t-value of 12.29. As the curves of 642 and 643 are almost identical, it seems likely that the timbers were cut from the same tree.

A master curve was made from the matching sequences. The ring widths of this 262-year sequence are given in the Appendix, along with the ring width data of the individual samples. The unmatched sequences, 622 and 649, were compared with the Hartlepool master but no agreements were found. The master curve was then tested against various dated reference chronologies. Comparison of Hartlepool with the St Hugh's Lincoln chronology (Laxton et al, 1982) produced a t-value of 7.05 when the Hartlepool curve covered the period AD 951-1212. This was confirmed by correlation with other chronologies over the same period: Scotland (Baillie, 1977) gave a t-value of 3.52, Nantwich (Leggett, 1980) 4.88, and Beverley Hall Garth (Hillam, unpubl.) 3.00. There can be no doubt therefore that the Hartlepool master curve dates to AD 951-1212.

The outer rings of 493, 494, 642 and 643 date to AD 1212, 1212, 1208 and 1113 respectively (Table 2). Since the bark edge was recognised on 494, the felling date for the timbers is late AD 1212 or early 1213. Until recently, timbers were rarely seasoned unless they were to be used for panelling or furniture (e.g. Hollstein, 1965). It is therefore likely that the Hartlepool timbers were used for construction in AD 1212-1213.

The trees used to produce the timbers were slow-grown oaks of less than 1m in diameter. They were at least

200 years old when felled, and 643 must have been over 300 years old. This suggests that the trees grew in dense woodland, where conditions were limiting to growth.

Acknowledgements

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References

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Hollstein E. 1965 Jahrringchronologische Datierung von Eichenhölzern ohne Waldkante. Bonner Jahrbuch 165, 12-27.

Laxton R.R., Litton C.D., Simpson W.G. & Whitley P.J. 1982 Tree-ring dates for some East Midland buildings. Trans. Thoroton Soc. 86, 73-8.

Leggett P.A. 1980 The use of tree-ring analyses in the absolute dating of historical sites and their use in the interpretation of past climatic trends. Ph.D. thesis, Liverpool Polytechnic.

Table 1: Details of timbers. Sketches are not to scale; maximum dimensions of the cross-sections are given.

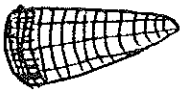
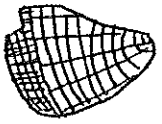
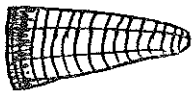
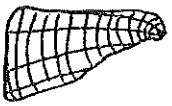
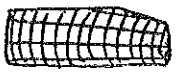
no.	no. of rings	sapwood rings	average width(mm)	sketch	dimensions (cm)
493	231	43	1.22		28 x 14
494	181	23 bark edge	0.90		20 x 18
622	106	19	0.84		24 x 9
642	250	33	1.33		31 x 11
643	256	-	0.84		22 x 15
649	181	4?	1.40		27 x 9

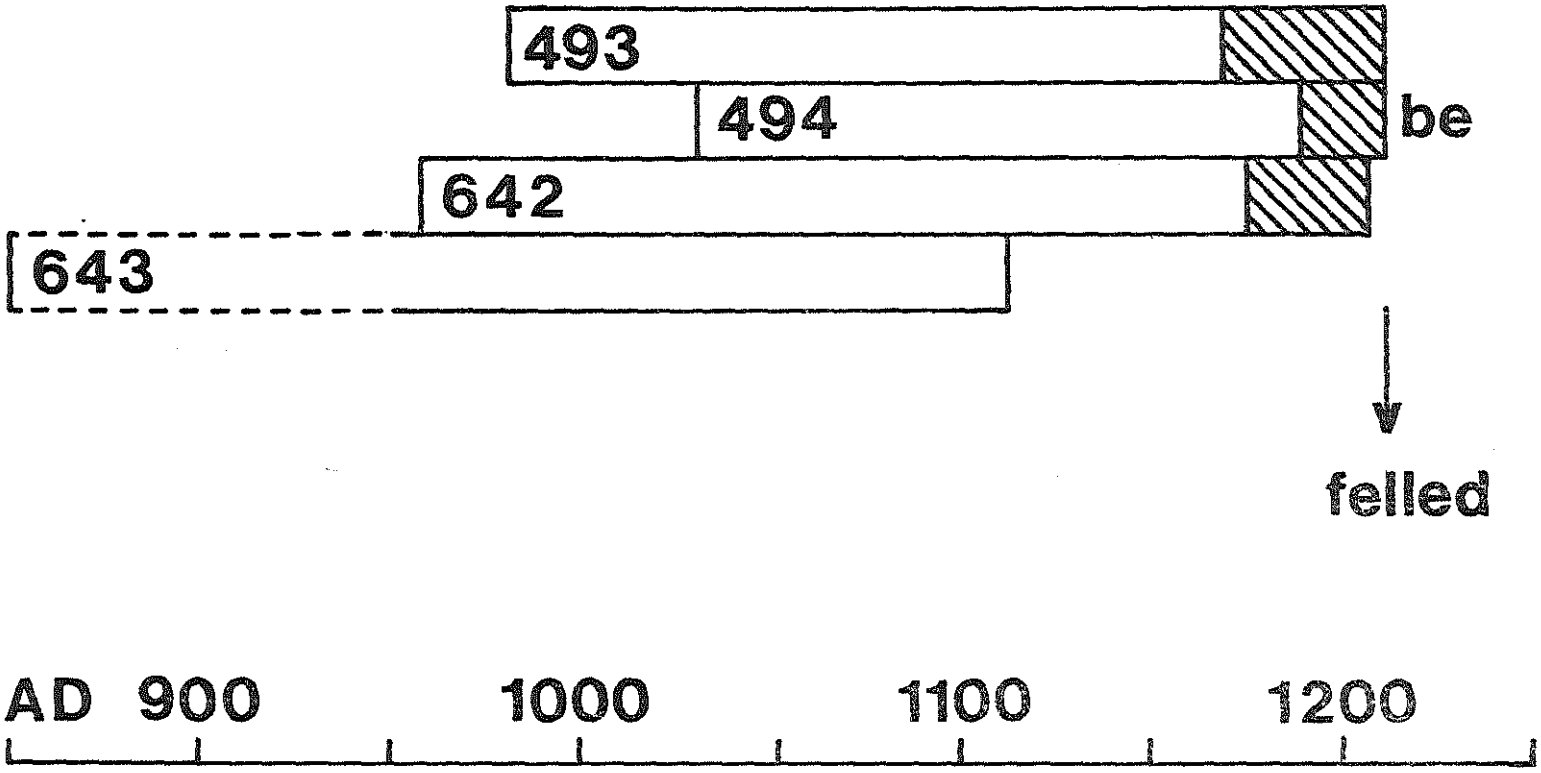
Table 2: Summary of tree-ring dates. Date of the heartwood-sapwood transition (if present) is given in brackets. The Lincoln chronology was made available by the Nottingham Tree-Ring Group.

sample no.	period covered by ring sequence	felling date	t-value with: 643	Lincoln
493	982-1212 (1170)	1212/13	9.13	4.36
494	1032-1212 (1190)	1212/13	6.77	5.46
642	959-1208 (1176)	1212/13	12.29	5.19
643	851-1113	1212/13	-	5.45
622	undated			
649	undated			

Legend to figure

Fig. 1: Bar diagram illustrating the relative positions of the dated ring sequences. The narrow rings of 643, which were difficult to measure, are represented by dashed lines; sapwood is hatched; be - bark edge.

Southgate/dendro
Fig. 1



Appendix

Ring width data. First line - site name; second line - sample name or number; third line - number of rings; fourth and subsequent lines - ring width values in 0.1mm (25 rings to a line). The first 100 ring widths of the master chronology, Hartmean, are ommitted because they may contain errors. They are included for reference in the data for 643; 643 is the only sample represented in the first 100 years of Hartmean.