

TREE-RING ANALYSIS OF WATTLING FROM LINCOLN, BRAYFORD WHARF  
EAST, 1982

Ruth Morgan

Summary

Tree-ring analysis was carried out on uprights and horizontals from 4 late Saxon and early medieval wattle structures consolidating the bank of the river Witham at the Brayford Pool. The two earlier structures were made of hazel and oak horizontals, and oak posts which were cut in summer to put in place when water levels were low. The two later structures were of willow/poplar horizontals and oak posts. The horizontals were selected for size of 10-20mm diameter, but showed no concentrations of age. Sampling was too limited to derive any information on the exploitation of local woodland.

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Excavation of the Brayford Wharf East site in Lincoln (henceforth BWE82) in 1982, by Tony Wilkinson and Brian Gilmour for the Lincoln Archaeological Trust, extended over four trenches totalling 56m in length. They revealed a series of about nine Roman, Saxon and medieval waterfronts along the river Witham. Each was made of layers of brushwood or more structured hurdling, placed on the low-lying marshy land beside the river, or the Brayford Pool, to consolidate the bank.

In order to discover the species and size of the wood available to and selected by those who constructed the waterfronts, wood samples were collected from four of the medieval structures, and the species identified by Maisie Taylor (of Fenland Archaeological Associates). Duplicate samples were submitted for tree-ring analysis to the Sheffield Dendrochronology Laboratory. Studies of prehistoric hurdle and brushwood structures in the Somerset Levels (Morgan 1977; 1982; Coles, Caseldine & Morgan 1982) and of a series of early medieval wattle fences at Wharram Percy (Morgan in prep.) have enabled procedures to be devised for maximising the information gained from apparently unpromising material.

Dendrochronological dating concentrates on oak timbers from mature trees, leaving the immature roundwood to be discarded or at best identified. However the study of such young material has shown that there is much potential information to be gained on woodlands and their exploitation in the past. The wood used for hurdling very often reveals a uniformity of size and age that can

only be the result of some form of coppice management, whereas brushwood assemblages usually include a very wide range in age and size owing to their haphazard collection. In addition, more mature roundwood with 20+ clear rings can be subjected to the usual dendro-chronological techniques of ring-width measurement and cross-matching of patterns. The construction of a relative time scale in this way can reveal the relationship between wooden elements such as posts. At least 30 - 50 growth rings on several oak samples are required for absolute dating, depending on the circumstances.

### The Brayford wood

The excavation trench was very narrow, and since the wooden structures lay across it in sequence, only short exposures could be seen. The lengths of the horizontal pieces of wood are not therefore known. The structures sampled were:

Context 93: the easternmost hurdle, and the earliest, of late Saxon date. 4 horizontals and 2 uprights sampled.

Context 94: a late Saxon hurdle. 3 horizontals and 2 uprights sampled.

Context 81: a late Saxon hurdle. 12 horizontals and 1 upright sampled.

Context 138: the westernmost hurdle of early medieval date. 4 horizontals sampled.

Contexts 93, 94 and 81 lay at about 3m intervals.

Wood identification (Table 1) showed that oak (Quercus spp) and hazel (Corylus avellana) were preferred for the two earliest hurdles (contexts 93 and 94), with a change to willow/poplar (Salix/Populus spp) and oak for the two later hurdles (contexts 81 and 138). The difference is important since, while willow/poplar would have grown along the river bank, hazel and oak prefer rather higher

and drier conditions - though their wide growth rings testify to a favourable environment.

The very limited sampling possible in the narrow trench makes a thorough survey of the range of wood used impossible, with only 28 samples from all 4 contexts.. It is usually recommended that at least 50 samples are collected from each hurdle or brush-wood structure, if meaningful patterns are to emerge from the data.

The BWE82 results must be viewed with caution for this reason.

### Tree-ring analysis

Short lengths of each stem, individually numbered, had been kept wet in polythene bags; in the laboratory the soft wood was deep-frozen to render the transverse surface hard enough for cleaning with a plane. This revealed the wood structure and growth rings clearly.

The wood was examined under low magnification (x10). The diameter under bark of each stem was recorded; the number of rings was counted and details of the growth pattern noted. Information on growth conditions can be gained from the width and variability of the rings; contemporaneity can be suggested even in very young stems of the same species by the same pattern of wide and narrow rings and the overall homogeneity of the assemblage. The widths of the innermost and outermost rings may indicate the season in which the stem was cut. This is particularly reliable in oak which has distinct bands of spring and summer growth, but less so in hazel or willow where a narrow outer ring could have climatic causes. In oak, the formation of spring vessels only indicates cutting around June, while a completely formed ring indicates cutting after October and before April of the following year.

None of the BWE82 stems had sufficient rings for ring-width measurement.

## Results

Species, ages and sizes of the stems from each context have been summarised (Table 1; Fig.1). They reveal the uniformity in stems performing the same function, irrespective of species. All the horizontal rods fell into the 3-15 year age range with a diameter range of 10-30mm. The average age was 7.5 years, the approximate length of modern hazel coppice cycles for hurdle-making (Edlin 1974). However the ages were not concentrated (Fig. 2a), partly explicable in their origin from variable and unknown positions on the stem, but also probably from the casual cropping of locally available wood. Selection for size was suggested by the strong preference for stems of 10-20mm diameter (Fig. 2b). The hazel was slightly more mature and larger than the willow/poplar; all these species are well suited for weaving owing to their flexibility, and the change from one to the other may have implications on changes in the woodland cover during this period, or on varying local traditions.

The uprights, all of oak, were 11-27 years old (averaging 16.8 years) and 70-85mm in diameter with one exception of 38mm; such stout oak posts would be well suited to the wet environment. They were roundwood, apart from one post from context 93 which had been squared on two sides (possibly near its base).

The oak posts from contexts 93 and 94 came from fast-grown trees; they were also cut in summer, in contrast to the winter cutting suggested by the horizontals. This implies that the posts were put in place while the water levels were lower during the summer.

Owing to the limited number of samples, comments on

woodland management practices in the early medieval period based on this data could be misleading. However, the uniform size of the hazel and willow/poplar rods does suggest that they had been cut over before and were maintained for their crop of rods, even if not on a regular cycle. Rods of a required size could then be cut when needed.

Wattle boundaries of comparable date from the mill pond at Wharram Percy have recently been studied (Morgan in prep.). They presented a similar construction of stout oak posts with <sup>woven</sup> uprights around with rods of various species. The rods lay within an almost identical range of age (3-21 years) and diameter (13-31mm), but the uprights around which they were woven, again of a variety of species, were smaller than those from BWE82 (4-48 years averaging 11.6 years; 25-60mm).

Wattle construction was evidently a very familiar technique of creating boundaries and walls in the early medieval period, shown by its regular appearance on urban sites (eg Hall 1984; Murray 1980; 1983). It must have required some organisation to make the best use of woodland resources and to provide a regular crop of rods and poles for structures such as those at Brayford Pool.

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TABLE 1. Summary of the tree-ring samples from Brayford Wharf East, Lincoln.

CONTEXT	NO. OF SAMPLES, SPECIES + FUNCTION	AGE RANGE	DIAMETER RANGE MM	FELLING SEASON W=WINTER S=SUMMER
93	2 oak horizontals	5-6	21-22	W
	2 oak uprights	14-27	70-80	S
	2 hazel horizontals	9-11	16-17	W
94	3 hazel horizontals	7-11	16-19	W
	2 oak uprights	16	70-85	S
81	12 willow/poplar horizontals	3-9	10-29	W
	1 oak upright	11	38	W
138	3 willow/poplar horizontals	7-15	17-30	W
	1 oak horizontal	9	22	W



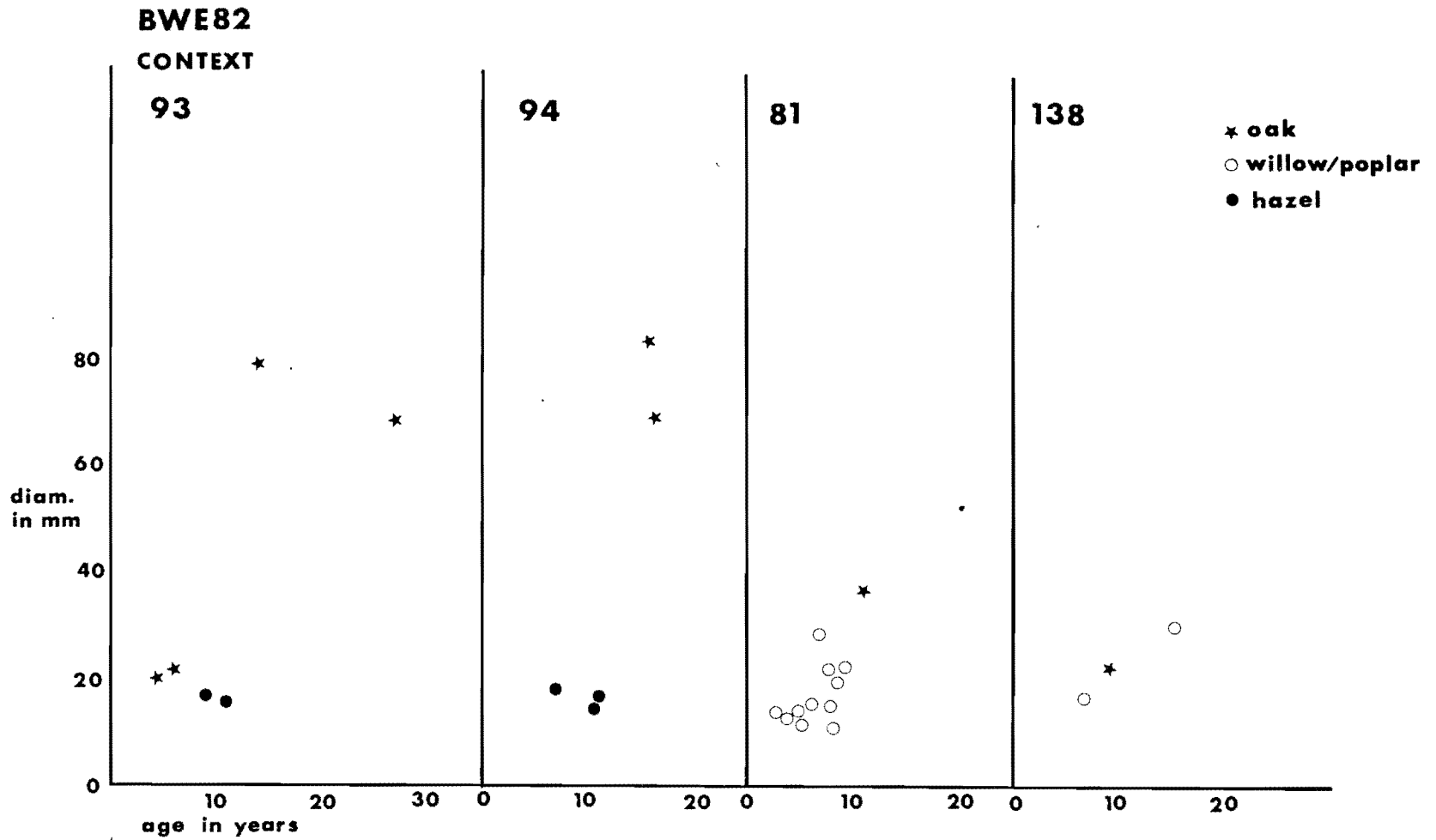
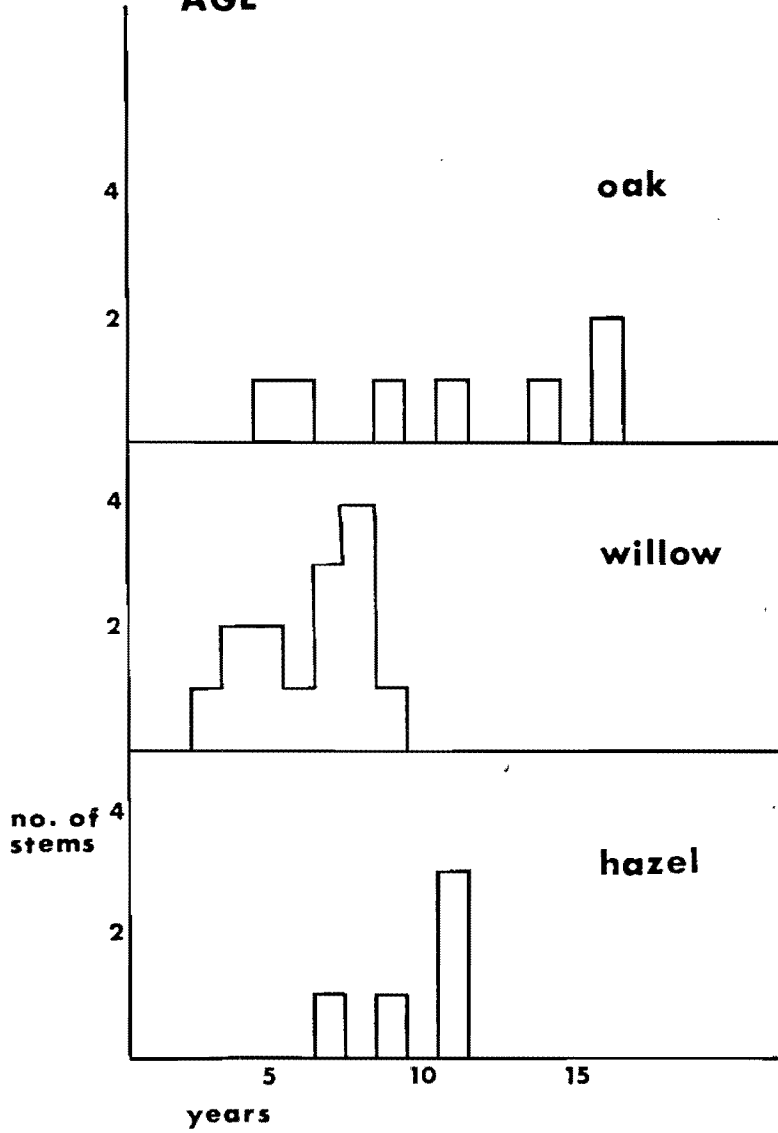


Fig. 1 The age and size distribution of the wood from each hurdle structure; the stems of smaller and quite uniform diameter are rods or horizontals and the larger stems are posts.

**BWE82**

**AGE**



**DIAMETER**

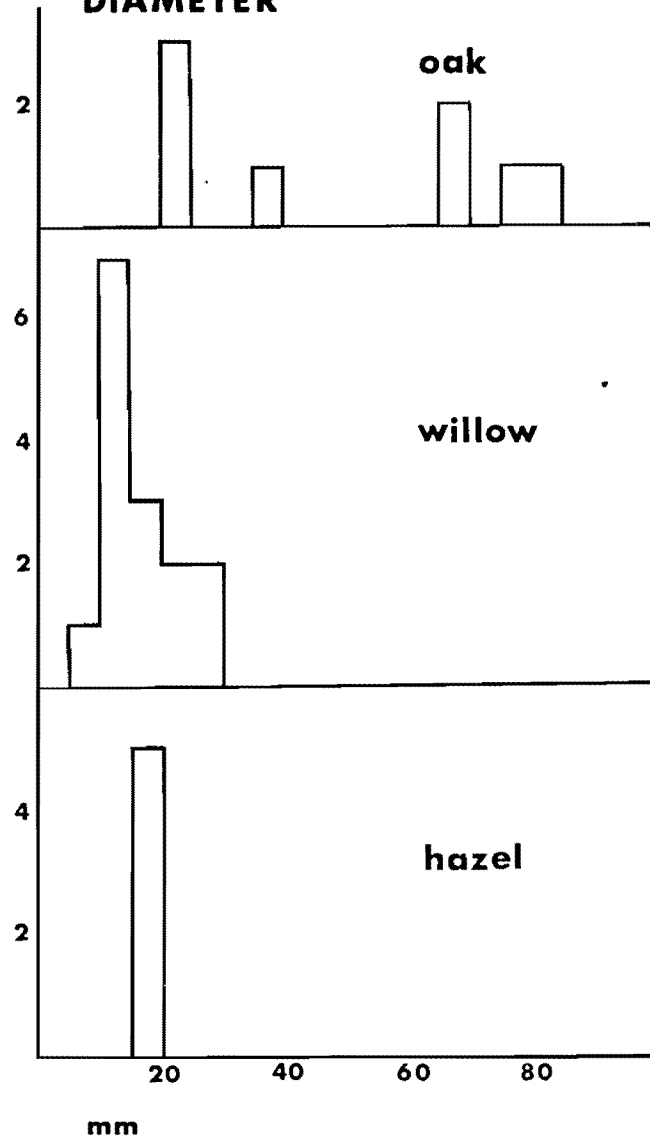


Fig. 2 a (left) age range of the Brayford wood samples; b (right) diameter range.