Report 1779

Dendrochronological analysis of timbers from the Aldwincle bridge.

Five sections of the bridge timbers were available for analysis; all were of oak (Quercus) and had been waterlogged but allowed to dry out to some extent. One sample was too wide-ringed and soft to be of any value; the other four consisted of two entire trunks with the curved edges and sapwood hewn away and two segments of the trunk, one with traces of very soft sapwood remaining (53) (see Table 1).

One radius of each wood section was cleaned up with a sharp knife and the ring-widths measured to 0.1mm. and plotted on semi-logarithmic paper. The ring-width sequences could then be matched by overlaying on a light-table and assessing the degree of similarity at different positions. They were also compared by computer with the exception of sample 16 which had too few rings to provide the necessary overlap.

The plotted ring-width curves show a sensitive (variable) growth pattern and a gradual decrease in ring-width with age. Near the pith area the rings are wide, up to 5mm.; as the tree matures at about 30 years, widths fall to between 1mm. and 2mm. As traces of sapwood remain on one sample, the trees would probably have been less than 100 years old, since sapwood averages a width of about 25 annual rings. A comparison of the patterns shows that samples 53 and ? are likely to have originated in the same tree, since the fluctuations in ring-width are very similar(Fig. 1); the computer calculated a similarity value of 65.3% (Student's t 2.93 using the Belfast program) for the two curves. The ring sequences from samples 12 and 16 did not match as clearly; sample 12 correlated satisfactorily (Fig. 1) with values of 65.1% with 53 and

63.5% with sample ?, but the visual matching is not conspicuous. Curve 16 showed no good positions of agreement, and has been only tentatively inserted in Fig. 2. The values for curves 53, ? and 12 were averaged, and the mean annual values are listed in Table 2.

No sapwood rings could be definitely measured, but since the sapwood was visible on sample 53, it can be assumed to begin within a year or two of the final measured ring (ring 63 on Fig. 1). Sapwood retains a uniform width of about 25 years; thus it is possible to estimate the year of felling even if only one ring of sapwood remains. Therefore, an addition of 25 or 30 years to the last measured ring of sample 53 gives the approximate year of felling, as is shown by a dotted line in Fig. 2. It is not possible to determine the same for the other samples, but since it appears likely that sample ? comes from the same tree as 53, it also could be given a felling date.

A radiocarbon sample of about 180 grams was removed from rings 30 to 40 of sample 53, with the aim of obtaining an exact date by the use of wood of known relative age. The resulting date of 20 $\pm$ 80 bc proves to be very satisfactory; the date requires an addition of about 30 years in order to reach the transition from heartwood to sapwood (midpoint year 35 to final ring c. year 65), and a further 25 years to reach the bark and the year of felling, giving a date of A.D. 35. Calibrated by means of the Ralph, Michael and Han table (MASCA Newsletter, 9 1973), the calendar date is about A.D.110. The date thus suggests that the bridge was constructed in the late first or early second centuries; dating may be possible almost to the year in the future if the tree-ring curve can be matched to already dated material.

Ruth A. Morgan.
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Legends to tables and figures.

Table 1 — Data concerning the analysed samples from the Aldwincle bridge.

Table 2 — Mean annual values (0.1mm.) for three samples from the Aldwincle bridge.

Figure 1 — Plotted ring-width curves for three of the Aldwincle samples; each circle represents the width of the ring. The abscissa represents years and the ordinate millimetres with a logarithmic scale. Samples ? and 53 match well; sample 12 shows broadly the same year to year pattern but not the same overall trend. The final ring of sample 53 (ring 63) is close to the boundary between heartwood and sapwood, and therefore about 25 years before the year of felling.

Figure 2 — Block diagram showing the relative positions of the four tree-ring sequences; that for sample 16 has been tentatively inserted as the curve does not agree well and is shorter than the others. The dotted line on the block for sample 53 represents the probable amount of sapwood which has been lost; thus the tree was felled in about relative year 88. These additions must be made to the radiocarbon date of 20 $\pm$ 80 bc, calculated on growth rings 30 to 40 of sample 53 (marked by crosses).

Timbers from the Roman bridge, Aldwincle, Northants.

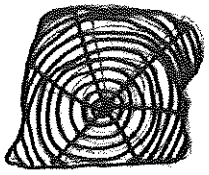
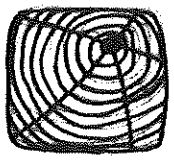
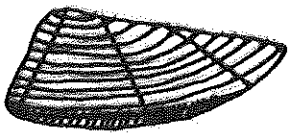
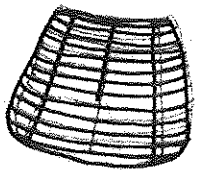
No.	No. of rings	No. of sapwood rings	Dimensions	Sketch	Comments.
12	54	-	21x22 rad.		- very hard ck.
16	36	-	21x19 rad.		
53	63	present; too soft to measure	46x26 rad.		
?	50	-	18x16 rad. 1		

Table 1

Aldwincle Roman timbers

Meaa annual values of three samples. 0.1mm.

	1	2	3	4	5	6	7	8	9	10
1	37.0	33.0	23.0	30.0	47.0	53.5	45.3	52.6	43.3	49.3
11	51.6	45.6	28.3	29.3	25.6	33.0	33.3	32.6	23.3	24.0
21	26.6	35.6	40.0	37.6	35.3	25.6	29.0	40.0	35.0	28.3
31	30.0	19.7	16.3	21.7	21.6	18.6	14.7	17.7	18.0	22.0
41	14.7	14.3	15.7	18.7	15.0	14.3	13.0	16.0	13.7	20.3
51	21.7	20.0	21.3	20.3	18.7	13.5	12.0	11.0	13.5	13.0
61	12.0	10.0	9.0							

ALDWINCLE

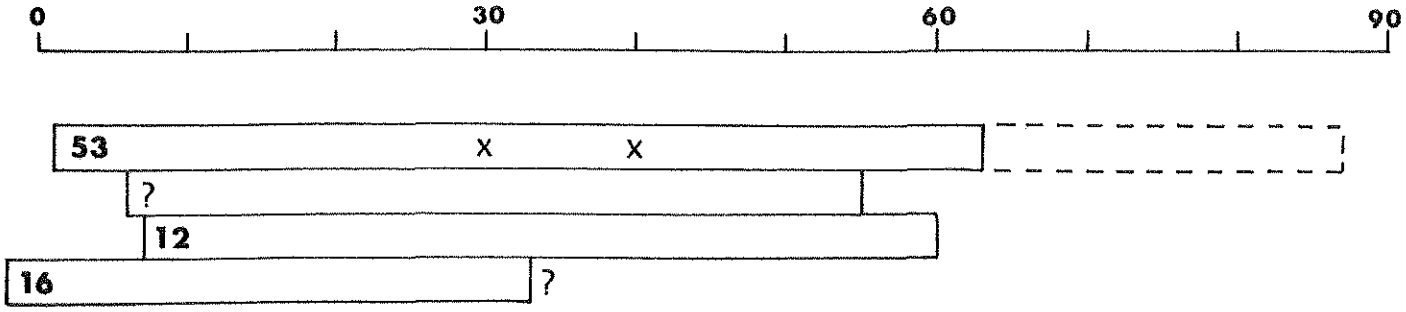
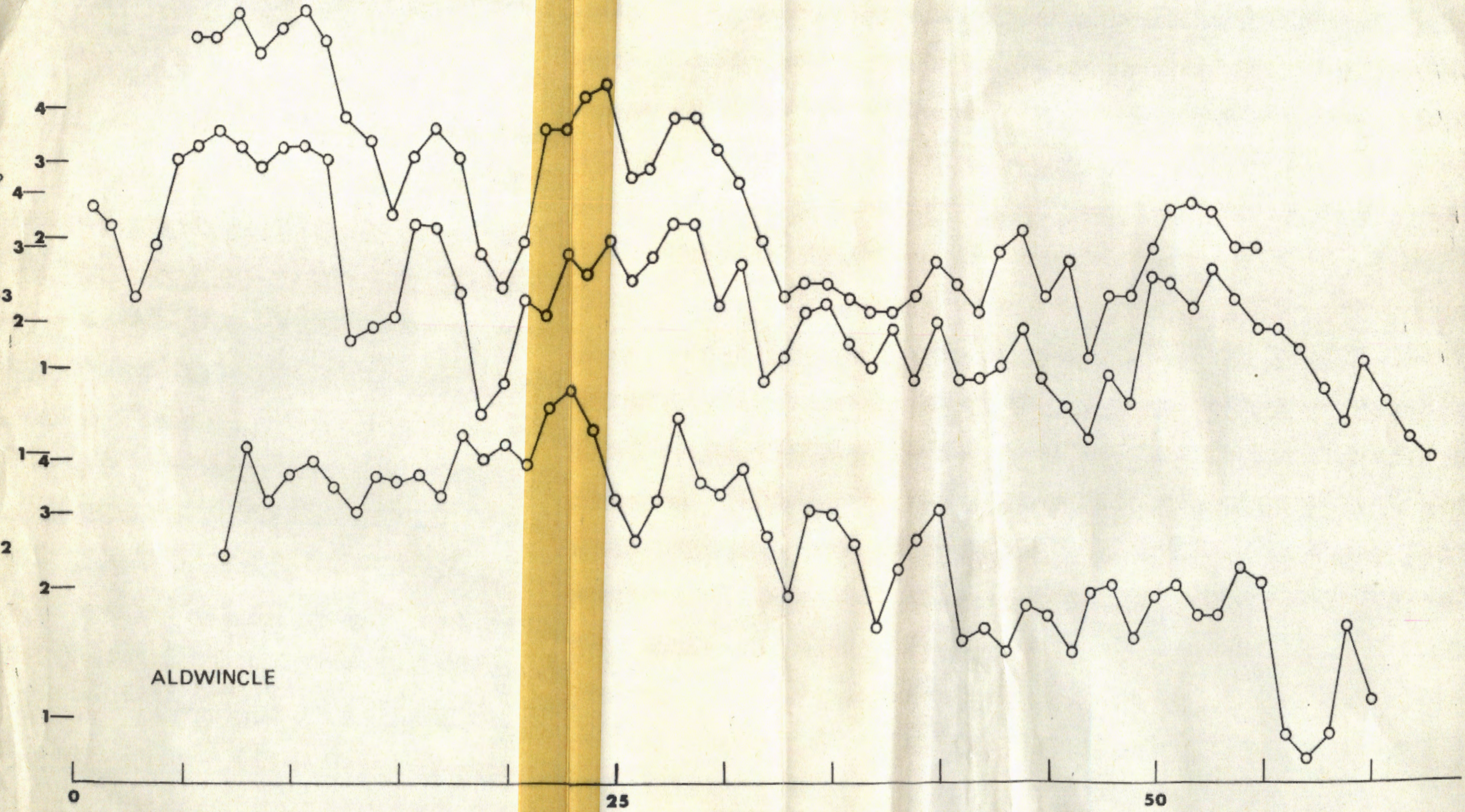


Figure 2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ALDWINCLE
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