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August 1978.

Report
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Recent excavation at Glastonbury, Somerset, uncovered four timbers thought to be associated with the first monastic enclosure of the Abbey. Samples F249A and F249B, two unworked branches, were found in the primary silting of a ditch which measured c.10m. wide and 5m. deep. The primary silting of a shallower ditch, c.5m. wide by 2m. deep, produced samples F239 and F263. Both were worked timbers and could have originally been part of a wooden bridge over the ditch. The date of the ditch, from other archaeological evidence, lies between AD 400 and c.900.

The samples were sent to the DoE's dendrochronological laboratory at Sheffield, where it was hoped that tree-ring analysis would give a precise date for these important timbers. This would perhaps indicate a date for the foundation of the Abbey, at present thought to be c.AD 400 - 650.

Dendrochronological dating depends upon the construction of tree-ring chronologies, produced by measuring the widths of the annual rings on successively older wood samples, from the present day back in time. In Britain and Europe, where oak has been the most frequently studied species, many absolutely-dated chronologies have been obtained. Undated tree-ring sequences are known as floating chronologies and are important in providing information about the relative dating of a site. Since, in the British Isles, there are no absolute sequences earlier than c.AD 800, floating ring curves must be used for this study. Unfortunately, although numerous Roman curves are available, only two chronologies cover the relevant period. One, from N.E. Ireland, is dated to c. 100 BC - AD 700 by radiocarbon (Hillam and Baillie, unpublished) and the other, Ref

8, is dated by its author to c. AD 500 - 800 (Fletcher, 1977). Hence, no very precise date is yet possible for the Glastonbury timbers, but it was hoped that dendrochronology would provide a reasonably accurate date using these two reference chronologies. Failing this, radiocarbon analysis would give a rough estimate of the age of the wood.

Method

The samples were cleaned and sawn down into smaller-sized sections where required. F249A consisted of clay with a small piece of wood and traces of charcoal embedded in it. The wood, too small for either tree-ring or radiocarbon analysis, was identified as oak (*Quercus* spp.), but the charcoal was not substantial enough for identification.

The wood of F249B, again surrounded by much clay, was broken lengthwise into several pieces. This made it useless for dendrochronology, since its tree-ring record was incomplete. A sample of 20 years was submitted for radiocarbon measurement, although there was no way of knowing from which part of the oak branch the sample originated.

The worked timbers were in far better condition and were suitable for both radiocarbon and tree-ring work. They were probably posts or stakes which had been adzed from halved tree trunks of oak (Table 1). The sections were deep-frozen to enable their surfaces to be cleaned with a surform plane. The ring-widths were measured on a travelling stage under a binocular microscope. Tree-ring curves were made by plotting the widths, in 0.1mms., against time, in years, on transparent semi-logarithmic recorder paper.

Results

Details of the four samples are given in Table 1. F239 and F263 contained a disappointing number of rings. At least 50 rings

needed for reliable dating, although a minimum number of 100 is preferred. Visual comparison, by sliding one graph over the other until the two curves are found to be synchronous, suggested that they were contemporary. To support this, a computer program written for tree-ring research was used (Baillie and Pilcher, 1973). It compares two sets of data and calculates the Student's t-value for each position of overlap; any value higher than 3.5 is statistically significant, but does not necessarily give a guarantee of crossmatching. The value between the two Glastonbury curves was 5.11, at the position shown in Figure 1. However, the 38 rings of F263 mean that this match cannot be accepted with 100% confidence since a pattern of so few rings may not be unique (Huber and Giertz, 1970).

The computer was used to compare F239 with the two floating chronologies mentioned above. No matching was found with Ref 8, but the Irish chronology gave several significant t-values of between 3.5 and 4.5. After checking these visually, it was felt that, in view of the distance between Somerset and N.E. Ireland and of the shortness of the 239 curve, none of the matches were acceptable.



Samples from both worked pieces were sent to Harwell for radiocarbon analysis. On receiving the results it may be possible to date the timbers more closely, but this is not very likely unless new tree-ring chronologies of that period become available for the Somerset area.

References

- Baillie M.G.L. and Pilcher J.R. 1973, A simple crossdating program for tree-ring research. *Tree Ring Bulletin* 33 7-14.
- Fletcher J.M. 1977, Tree-ring chronologies for the 6th to 16th centuries of Southern and Eastern England. *J. Arch. Sci.* 4 335-352.
- Huber B. and Giertz V. 1970, Central European Dendrochronology for

the Middle Ages. In 'Scientific Methods in Medieval Archaeology',
ed. R. Berger. Univ. of California Press, London, 201-212.

Table 1. Details of tree-ring and radiocarbon samples.

no.	species	no.of years	sapwood	C-14	sketch	dimensions
F249A	oak	few	-	-	-	-
F249B	oak	?	-	20 years HAR-	sample broken	-
F239	oak	79	-	yrs 15-34 HAR-		16 x 28 cm
F263	oak	38	-	yrs 10-30 HAR-		6-7 x 18 cm

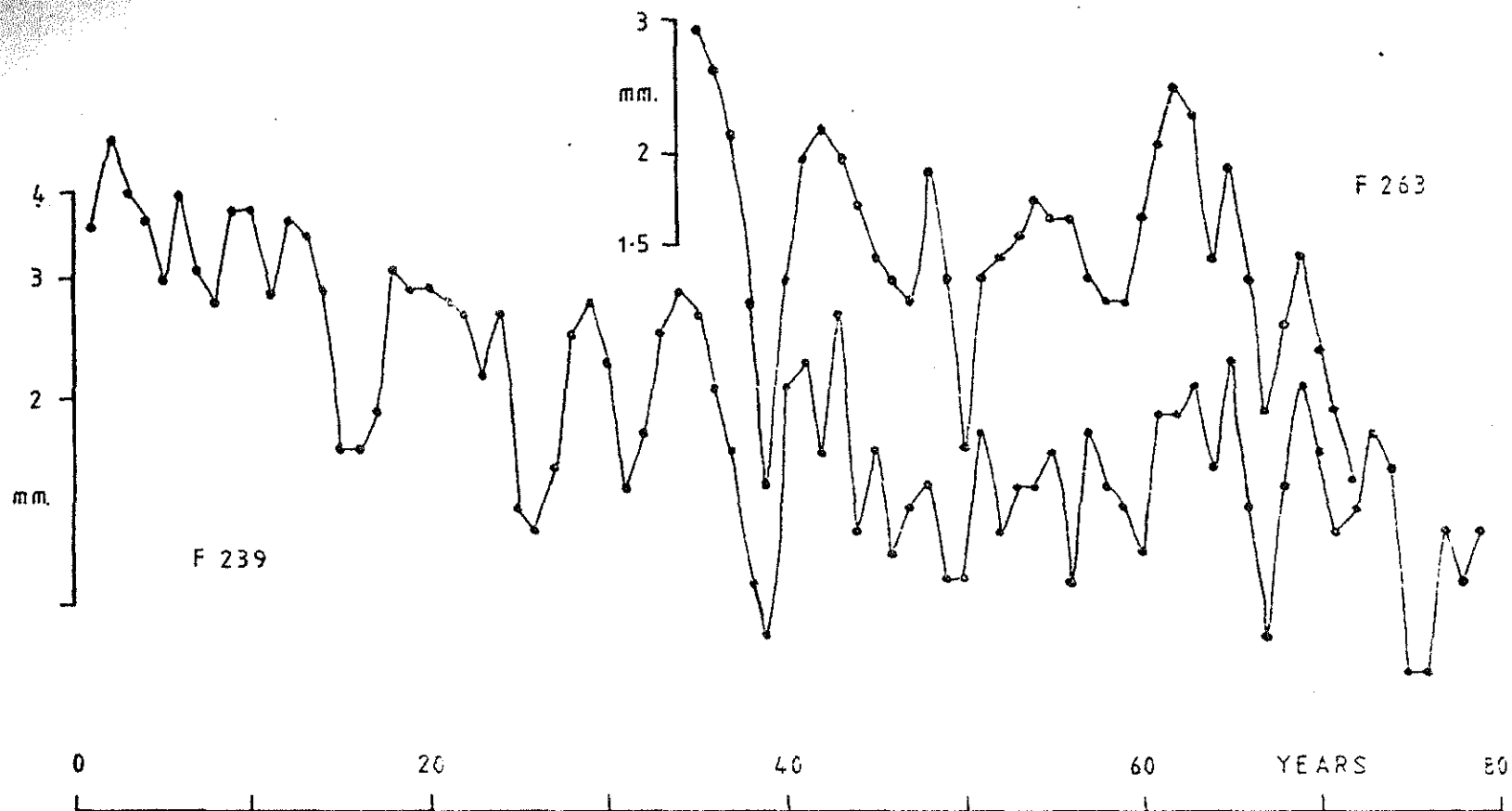


Figure 1. Suggested position of agreement between F239 and F263. t -value = 5.11, but match cannot be accepted with complete certainty because of the short overlap.