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Report 11/97

TREE-RING ANALYSIS OF THE HALL AND BARN AT GREAT TOMKYNS, UPMINSTER, GREATER LONDON

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Summary

Dendrochronological analysis of ten samples from the hall house at Great Tomkyns, Upminster, Greater London, has failed to produce any useful evidence for either the construction date of the structure or any subsequent modifications of it. Almost all timbers, even of marginal suitability, were sampled and it seems unlikely that the structure includes any other timbers suitable for analysis by dendrochronological techniques. The barn at the same site was subject to a detailed assessment but has no timbers suitable for analysis.

Author's address :-

I Tyers
SHEFFIELD DENDROCHRONOLOGY LABORATORY
Archaeology Research School
West Court 2 Mappin Street
Sheffield
S1 4DT

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Introduction

This document is a technical archive report on the tree-ring analysis of timbers from Great Tomkyns hall house and barn, Upminster (NGR TQ566894). It is beyond the dendrochronological brief to describe the building in detail or to undertake the production of detailed drawings. As part of a multifaceted and multidisciplinary study of the building, elements of this report may be combined with detailed descriptions, drawings, and other technical reports at some point in the future to form either a comprehensive publication or an archive deposition on the building. The conclusions presented here may therefore have to be modified in the light of subsequent work.

The hall house at Great Tomkyns is a medieval timber-framed central aisled hall with two cross-wings. The central range and west wing are thought to be late fifteenth century, whilst the east wing is slightly later (Figs 1a - 1f). The barn is a medieval timber-framed aisled barn with three bays and a later roof probably added in the eighteenth century (Fig 1g). It shows a number of constructional similarities to the Upminster Tithe Barn (Bond 1993), which is also the subject of a dendrochronological study (Tyers forthcoming). The tree-ring dating at Great Tomkyns was undertaken at the request of Richard Bond from English Heritage primarily to provide a more precise construction date for both structures. A secondary aim was to provide data which will strengthen the southern Essex tree-ring chronology (see Tyers 1993).

Methodology

Plans and sections prepared by Richard Bond were provided for both structures. These and invaluable assistance from Gary Budgen (President, Essex Architectural Research Society, whose family live in the hall house) enabled a comprehensive survey to identify those timbers with the most suitable ring sequences for analysis. Those with more than 50 annual rings and some survival of the original sapwood and bark-edge were sought.

The most promising timbers were sampled using a 15mm diameter corer attached to an electric drill. The cores were taken from the timbers in the most suitable direction for maximising the numbers of rings for subsequent analysis. The core holes were left open. The ring sequences in the cores were revealed by sanding.

The complete sequences of growth rings in the samples that were selected for dating purposes were measured to an accuracy of 0.01mm using a micro-computer based travelling stage. The ring sequences were plotted onto semi-log graph paper to enable visual comparisons to be made between sequences. In addition cross-correlation algorithms (Baillie and Pilcher 1973; Munro 1984) were employed to search for positions where the ring sequences were highly correlated. These positions were checked using the graphs

and, where these were satisfactory, new mean sequences were constructed from the synchronised sequences. The *t*-values reported below are derived from the original CROS algorithm (Baillie and Pilcher 1973). A *t*-value of 3.5 or over is usually indicative of a good match, although this is with the proviso that high *t*-values at the same relative or absolute position must be obtained from a range of independent sequences, and that these positions are supported by satisfactory visual matching.

All the measured sequences from this assemblage were compared with each other and any found to cross-match were combined to form a site master curve. These, and any remaining unmatched ring sequences were tested against a range of reference chronologies, using the same matching criteria: high *t*-values, replicated values against a range of chronologies at the same position, and satisfactory visual matching. Where such positions are found these provide calendar dates for the ring-sequence.

The tree-ring dates produced by this process initially only date the rings present in the timber. The interpretation of these dates relies upon the nature of the final rings in the sequence. If the sample ends in the heartwood of the original tree, a *terminus post quem (tpq)* for the felling of the tree is indicated by the date of the last ring plus the addition of the minimum expected number of sapwood rings which may be missing. This *tpq* may be many decades prior to the real felling date. Where some of the outer sapwood or the heartwood/sapwood boundary survives on the sample, a felling date range can be calculated using the maximum and minimum number of sapwood rings likely to have been present. Alternatively, if bark-edge survives, then a felling date can be directly utilised from the date of the last surviving ring. The sapwood estimates applied throughout this report are a minimum of 10 and maximum of 55 annual rings, where these figures indicate the 95% confidence limits of the range. These figures are applicable to oaks from the British Isles (Hillam *et al* 1987). The dates obtained by the technique do not by themselves necessarily indicate the date of the structure from which they are derived. It is necessary to incorporate other specialist evidence concerning the reuse of timbers and the repairs of structures before the dendrochronological dates given here can be reliably interpreted as reflecting the construction date of phases within the structure.

Results

The barn

The initial survey of the barn demonstrated quite clearly that no timbers suitable for analysis by dendrochronological methods were present in the main structural elements of the building. The jowls at the upper ends of the arcade posts revealed enough of the annual rings of the timbers to be certain that none were derived from surviving timbers that include more than about 30 rings even including the sapwood. A number of studs and other items replaced in the building over recent years confirmed the extensive presence of exceptionally fast-grown material throughout the structure. No sampling was undertaken and thus no dating results were produced.

The hall house

The initial survey of the hall house confirmed the impression gained on a previous visit to the building that relatively few timbers existed within the structure that were suitable for analysis. The surviving timbers

from the initial construction are few, and those that exist are fast-grown. A total of ten timbers, numbered **1-10** inclusive, were selected as most suitable for sampling (Table 1). Six were from the eastern (service) wing, numbered **1-6** inclusive (Figs 1c, 1d), and four were from the western wing, numbered **7-10** inclusive (Figs 1e, 1f). None of the apparently original timbers surviving in the central range were suitable for sampling. Sample **7** was not successfully extracted, and on return to the laboratory it was also discovered that samples **2** and **10** had insufficient rings for analysis to be undertaken, whilst sample **3** was in two sections.

Sequences from the seven usable samples were measured and compared with each other. Samples **1** and **4** were found to match (Table 2). They are clearly derived from the same parent log, and the sequences were combined to form a 100 year master curve, **1+4**. This, and all the remaining sequences were tested against a comprehensive collection of dated tree-ring chronologies from England and elsewhere in Europe in an attempt to identify a date for the sequence. No dates were obtained for any ring sequence since all failed to produce any visually and statistically acceptable matches. All sampled timbers from the house are thus undated by this analysis.

Discussion

As with so many buildings of the fourteenth to sixteenth centuries hitherto examined in Essex, the buildings at Great Tomkyns include timbers with exceptional growth rates, low levels of sensitivity and many features suggestive of their derivation from an extensively managed landscape. Ironically the elements that allowed the county to be filled with timber-framed buildings during this period, such as economic growth and extensively exploited woodlands, also conspire to make the dendrochronological analysis of those buildings much more difficult. Many buildings throughout the country are rejected for analysis during dendrochronological assessment, but in counties such as Essex and Devon borderline buildings will often have to be attempted. Here the barn was rejected, but the house, despite the small number of suitable timbers, was sampled and sadly has failed to produce any useful dating evidence. This result, whilst unfortunate, indicates that there are still problems in any attempt to routinely undertake dendrochronological analysis within the county.

The timbers present in the east wing of the hall house at Great Tomkyns seem to be derived from longer lived trees than those sampled in the west wing. This observation may provide some supporting evidence for the interpretation that the two wings are of differing dates. The identification of two storey posts from the east wing of the hall house as being derived from a single tree, although not especially earth-shattering, is at least a positive result considering the paucity of suitable material within the building. A more extensive sampling policy may allowed further same-tree matches to be identified within the buildings but the short ring sequences that would probably be obtained from the rest of the timbers in the building suggests such a policy is unlikely to produce any more dating evidence.

The barn at Great Tomkyns has been associated with the Upminster Tithe Barn on stylistic features (Bond 1993). The Upminster Tithe Barn has recently been dated by dendrochronology to the period AD 1423-

1440 (Tyers forthcoming). Unfortunately no comparable independent evidence of the date of the Great Tomkyns barn can be produced to test the stylistic association.

Acknowledgements

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References

Baillie, M G L, 1982 *Tree-Ring Dating and Archaeology*, London

Baillie, M G L, and Pilcher, J R, 1973 A simple crossdating program for tree-ring research, *Tree Ring Bulletin*, **33**, 7-14

Bond, R, 1993 Great Tomkyns Barn, Upminster, and the sequence of assembly of timber framed aisled barns, *Vernacular Architect,* **24,** 32-39

Hillam, J, Morgan, R A, and Tyers, I, 1987 Sapwood estimates and the dating of short ring sequences, in *Applications of tree-ring studies: current research in dendrochronology and related areas* (ed R G W Ward), BAR Int Ser, **333**, 165-85

Munro, M A R, 1984 An improved algorithm for crossdating tree-ring series, *Tree Ring Bulletin*, **44**, 17-27

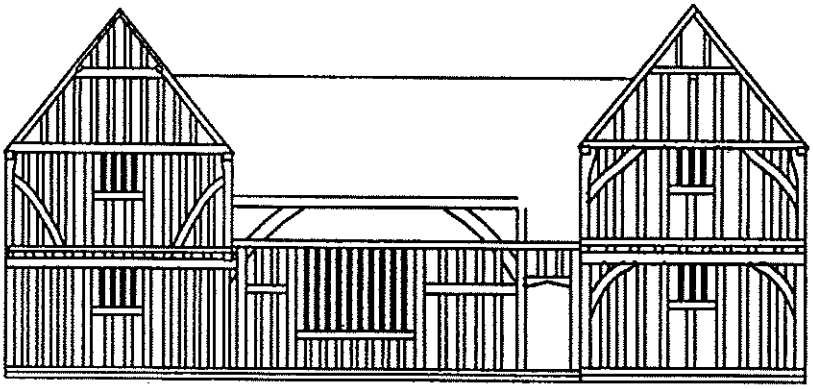
Rackham, O, 1990 *Trees and woodland in the British Landscape*, 2nd edn, London

Tyers, I, 1993 Tree-ring dating at Cressing Temple, and the Essex curve, in *Cressing Temple. A Templar and Hospitaller Manor in Essex* (ed D Andrews), 77-83

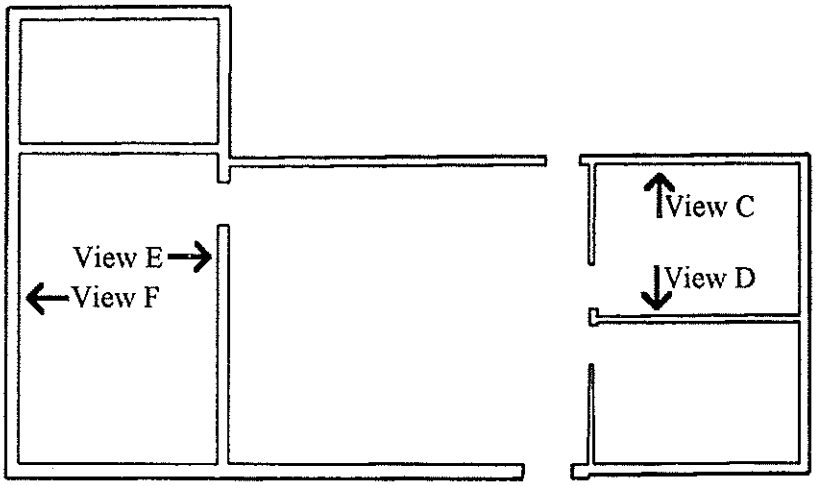
Tyers, I, forthcoming *Tree-ring analysis of Upminster Tithe Barn, Greater London*, Anc Mon Lab Rep

Figure 1

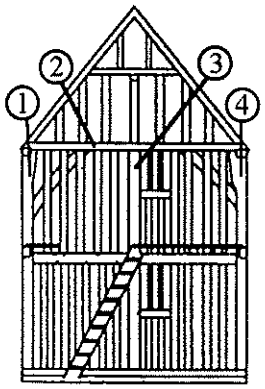
a. South elevation of Great Tomkyns hall house. The central range and west wing are thought to be late fifteenth century in date, the east wing is thought to date from *c* AD 1500 (after Bond pers comm)



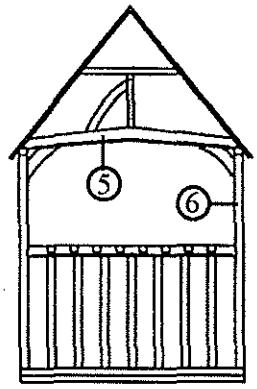
b. Plan of Great Tomkyns hall house showing the position of elevations C to F (after Bond pers comm)



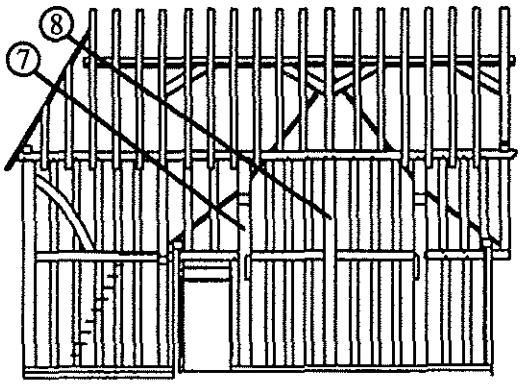
c. View C: North wall of east wing, showing location of sampled timbers 1-4 (after Bond pers comm)



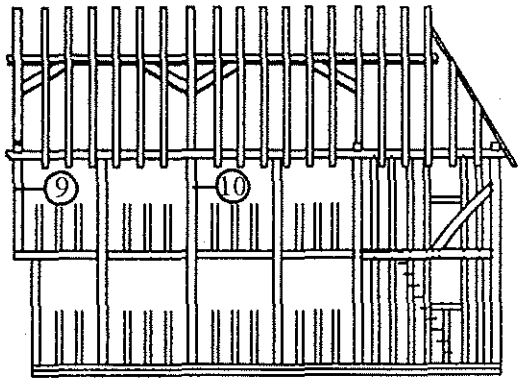
d. View D: Central truss of east wing, showing location of sampled timbers 5 and 6 (after Bond pers comm)



e. View E: East wall of west wing, showing location of sampled timbers 7 and 8 (after Bond pers comm)



f. View F: West wall of west wing, showing location of sampled timbers 9 and 10 (after Bond pers comm)



g. A typical truss from the Great Tomkyns barn, thought to date from the early fifteenth century (after Bond 1993)

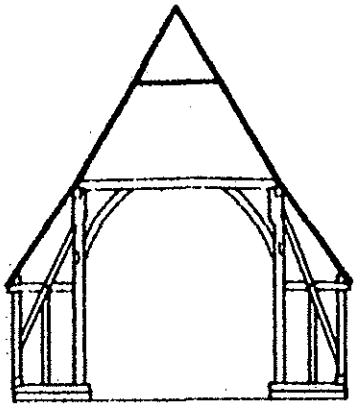


Table 1

List of samples

Core	Origin of core	Total rings	Sapwood rings	mm/year
1	East wing; NW storey post	99	-	2.54
2	East wing; N top plate	-	-	-
3	East wing; N central storey post	117	16	1.49
4	East wing; NE storey post	97	-	2.58
5	East wing; central EW tiebeam	112	5	1.24
6	East wing; W central storey post	66	10	2.46
7	West wing; E wall storey post	-	-	-
8	West wing; E wall central storey post	55	15+b	2.12
9	West wing; SW storey post	52	19	2.50
10	West wing; W wall storey post	-	-	-

Key: 'Sap rings' b bark-edge

Table 2

t-value matrix for the two matching sequences.

	4
1	9.73