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Church of St Lawrence, Moat Lane, Towcester, Northamptonshire

Tree-ring Dating of Oak Timbers in the West Tower

Martin Bridge and Cathy Tyers

Scientific Dating

Front cover image: Church of St Lawrence, Towcester. [Source: Martin Bridge]

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Summary

Four large beams supporting the ceiling to the ringing chamber were sampled. Only one was dated, giving a likely felling date range of AD 1468–1501. This may suggest that the tower was constructed in this period, and thus further elucidates the development of the porch and clerestory.

Contributors

Martin Bridge and Cathy Tyers

Acknowledgements

We are grateful to Brian Giggins, Chair of the Historic Towcester Survey, for coordinating this work and supplying drawings and background information, and to Rebecca Lane the local projects coordinator for Historic England (South West Region, Architectural Investigation). We are also grateful to the Revd Paula Challen and churchwardens who oversaw the faculty application and made arrangements for access. Thanks to Shahina Farid (Historic England Scientific Dating Team) who commissioned the work.

Archive location

Historic England Archive, The Engine House, Fire Fly Avenue, Swindon, Wiltshire SN2 2EH

Historic Environment Record

Northamptonshire Historic Environment Record, Northamptonshire Record Office, Wootton Hall Park, Mereway, Northampton, Northamptonshire NN4 8BQ

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Introduction

The Early Fabric in Historic Towns: Voluntary Group Projects, funded by Historic England, have been developed in the recognition and acknowledgement of the excellent work being undertaken by local vernacular groups in the study of local architectural trends and fabrics. The intention of these projects is to encourage this type of study through the provision of support and to facilitate training of more people in building analysis and recording. The local projects are coordinated by Rebecca Lane (Historic England South West Region: Senior Architectural Investigator).

Early Fabric in Towcester Project

Whilst there have been many local investigations of historic buildings in the town over a number of years, no systematic research had been undertaken before this project coordinated by Brian Giggins.

The project examines vernacular historic buildings in Towcester, aiming to improve understanding of the morphology and development of the historic town plan and to understand this within the framework of economic and social change. It aims to identify early plan forms and to understand the dates of the introduction of vernacular architectural details (e.g. in materials, carpentry, fenestration, and decorative features), thus mapping the survival of early (pre-1750) fabric and revealing the architectural evolution of the town's buildings.

Initially, properties were identified that were thought to be key to understanding the town's architectural development for a programme of comprehensive investigation. These properties were assessed for their suitability for dendrochronology and those that contained oak timber considered suitable for analysis were sampled and analysed.

Tower, Church of St Lawrence

The Church is a Grade I-listed building (List Entry Number: 1371638) located just off Watling Street East (Fig 1) dating from the thirteenth century. The tall three-stage west tower to the church has a many-moulded west doorway with fleurons to a deep hollow-chamfered surround with an ogee-arched head. There is a door, contemporary with the construction of the tower, that leads from the ringing chamber on to the lead roof of the nave, showing that the clerestory is contemporary with, or predates, the date of the tower. The work of raising the nave walls and constructing the tower followed serious problems with ground-settling of the west nave wall, which is believed to be over a Roman building.

Methodology

An initial assessment of the timbers for dendrochronological potential sought accessible oak timbers with more than 50 rings and where possible traces of sapwood, although slightly shorter sequences are sometimes sampled if little other material is available. The four main beams supporting the ringing chamber ceiling were assessed to be potentially useful, and were cored in February 2023 using a 16mm auger attached to an electric drill. The cores were labelled, and stored for subsequent analysis.

The cores were polished on a belt sander using 80 to 400 grit abrasive paper to allow the ring boundaries to be clearly distinguished. The samples had their tree-ring sequences measured to an accuracy of 0.01mm, using a specially constructed system utilising a binocular microscope with the sample mounted on a travelling stage with a linear transducer linked to a PC, which recorded the ring widths into a dataset. The software used in measuring and subsequent analysis was written by Ian Tyers (2004). Cross-matching was attempted by a process of qualified statistical comparison by computer, supported by visual checks. The ring-width series were compared for statistical cross-matching, using a variant of the Belfast CROS program (Baillie and Pilcher 1973). Ring sequences were plotted on the computer monitor to allow visual comparisons to be made between sequences. This method provides a measure of quality control in identifying any potential errors in the measurements when the samples cross-match.

In comparing one sample or site master against other samples or chronologies, *t*-values over 3.5 are considered significant, although in reality it is common to find demonstrably spurious *t*-values of 4 and 5 because more than one matching position is indicated. For this reason, dendrochronologists prefer to see some *t*-value in the range of 5, 6, and higher, and for these to be well replicated from different, independent chronologies with both local and regional chronologies well represented, except where imported timbers are identified. Where two individual samples match together with a *t*-value of 10 or above, and visually exhibit exceptionally similar ring patterns, they may have originated from the same parent tree. Same-tree matches can also be identified through the external characteristics of the timber itself, such as knots and shake patterns. Lower *t*-values however do not preclude same tree derivation.

Ascribing felling dates and date ranges

Once a tree-ring sequence has been firmly dated in time, a felling date, or date range, is ascribed where possible. With samples which have sapwood complete to the underside of, or including bark, this process is relatively straightforward. Depending on the

completeness of the final ring (ie if it has only the spring vessels or early wood formed, or the latewood or summer growth) a precise felling date and season can be given. If the sapwood is partially missing, or if only a heartwood/sapwood transition boundary survives, then an estimated felling date range can be given for each sample. The number of sapwood rings can be estimated by using an empirically derived sapwood estimate with a given confidence limit. If no sapwood or heartwood/sapwood boundary survives then the minimum number of sapwood rings from the appropriate sapwood estimate is added to the last measured ring to give a *terminus post quem* (*tpq*) or felled-after date.

A review of the geographical distribution of dated sapwood data from historic timbers has shown that a sapwood estimate relevant to the region of origin should be used in interpretation, which in this area is 12–45 rings (Miles 1997). It must be emphasised that dendrochronology can only date when a tree has been felled, not when the timber was used to construct the structure or object under study.

Results and Discussion

Although only four large timbers were available for sampling (Figs 2 and 3; Table 1), all four were sampled and proved to be oak. All appeared to be derived from relatively young, fast-grown, trees. One of the samples obtained had too few rings for secure dating purposes and was not further investigated. The raw ring-width data for the remaining three samples is given in the Appendix.

Comparison of the three measured ring-width series did not identify any secure cross-matching between these individual series. However, sample towch01, the longest series with 62 rings, was successfully dated when compared to the reference chronologies, the strongest matches being shown in Table 2. The presence of sapwood on this sample, allows a likely felling date range of AD 1468–1501 to be obtained for the tree from which this timber was derived. It is thought that this timber is associated with the initial construction of the tower, thus suggesting a construction date for the tower in the latter half of the fifteenth century. However, caution needs to be taken in interpreting a whole phase on the basis of a single dated timber.

This later fifteenth-century date obtained does fit in with a reference found by Brian Giggins, stating that Edward IV gave forty square feet of stone from his quarry at Handley in the forest of Whittlebury for building and repairing the steeple, church and churchyard at Towcester (Baker 1830).

Although matches were found over a wide geographical area, the strongest matches are predominantly from sites located in the surrounding counties, suggesting that the timber was probably of relatively local origin.

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Tables

Table 1: Details of the tree-ring samples taken from the ringing chamber in the west tower of the Church of St Lawrence, Towcester, Northamptonshire

Sample No	Location	Number of rings	Date of sequence (AD)	Sapwood	Mean ring width (mm)	Mean sensitivity	Felling date range (AD)
towcht01	West beam	62	1404–65	9	3.40	0.21	1468–1501
towcht02	Next beam east	44	-	2	4.69	0.17	-
towcht03	Third beam from west	24	-	h/s	5.29	0.18	-
towcht04	East beam	44	-	3	2.65	0.20	-

Key: h/s = heartwood/sapwood boundary

Table 2: Cross-matching for the sample towch01 AD 1404–65

Source region	Chronology	Publication reference	Filename	Span of chronology (AD)	Overlap (years)	*t*-value
Oxfordshire	9 Northfield End, Henley	Miles et. al. 2018	HENLEY11	1387–1471	62	7.1
Cheshire	Combermere Abbey, Whitchurch	Howard et. al. 2003	CBMASQ01	1371–1564	62	6.5
Warwickshire	Gorcott Hall	Nayling 2006	GORC_T17	1385–1531	62	6.5
Oxfordshire	Guildhall, Chipping Norton	Bridge and Tyers 2020	CNGLDHLL	1338–1508	62	6.5
South Yorkshire	Broom Hall, Broomhall, Sheffield	Hillam and Ryder 1980	BROOMH	1379–1474	62	6.5
Berkshire	Song School, Windsor Castle	Bridge and Miles 2016	WINDSOR5	1316–1478	62	6.3
Oxfordshire	Priory House, Christ Church, Oxford	Miles and Bridge 2015	CCECx2	1399–1489	62	6.3
Rutland	Lyddington Bede House, Lyddington	Arnold et. al. 2015	LYBHSQ03	1245–1494	62	6.2
Berkshire	Windsor Castle kitchen	Hillam and Groves 1996	WC KITCH	1331–1573	62	6.0
Worcestershire	Hoarstone Farm, nr Bewdley	Tyers 2008	HOARSTNE	1350–1617	62	6.0

Figures

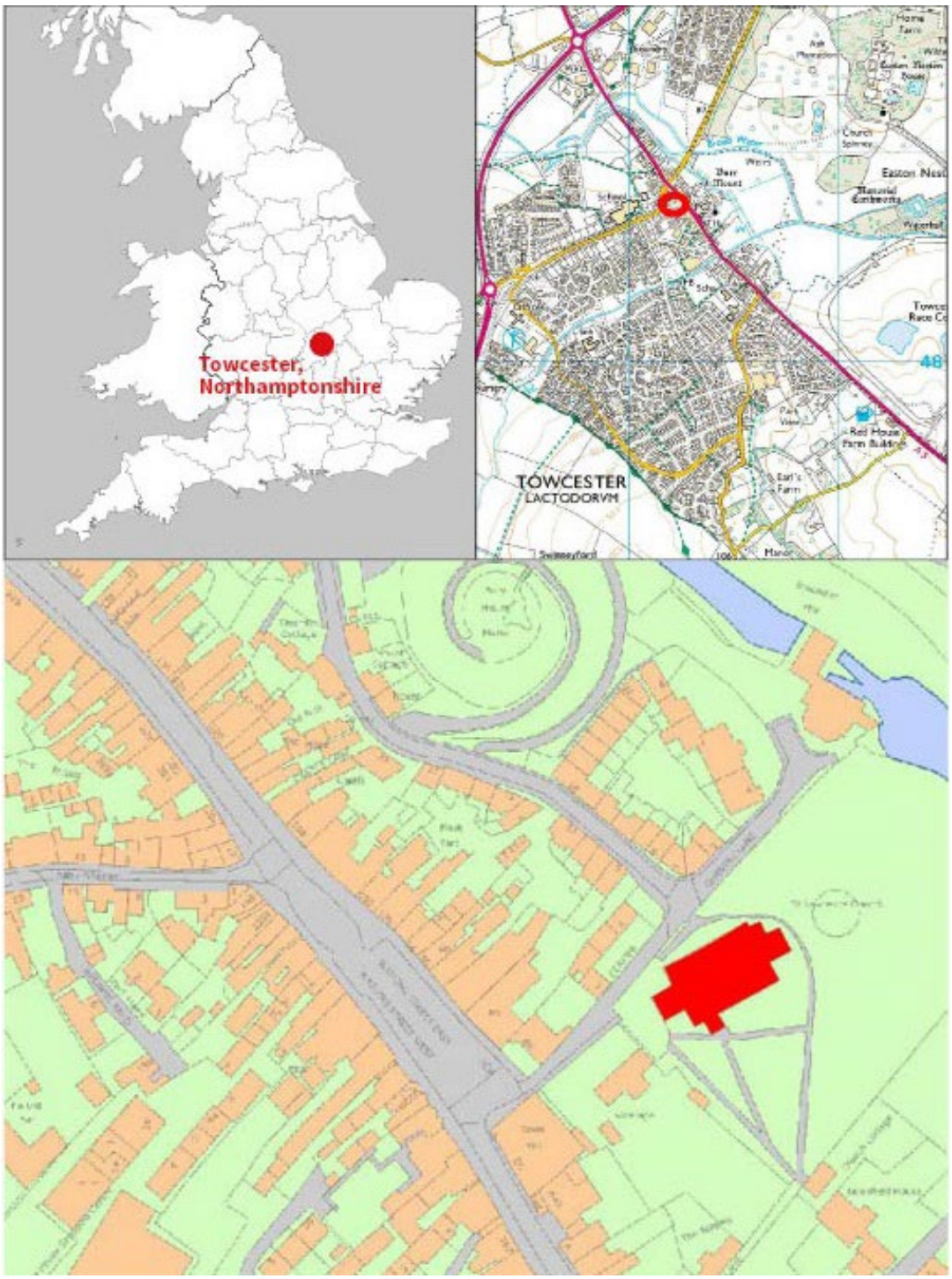

Figure 1: Map to show the location of the Church of St Lawrence in Northamptonshire. Marked in red: top left on map of England; top right scale: 1:25,000; bottom scale 1:1,300. [© Crown Copyright and database right 2023. All rights reserved. Ordnance Survey Licence number 100024900]

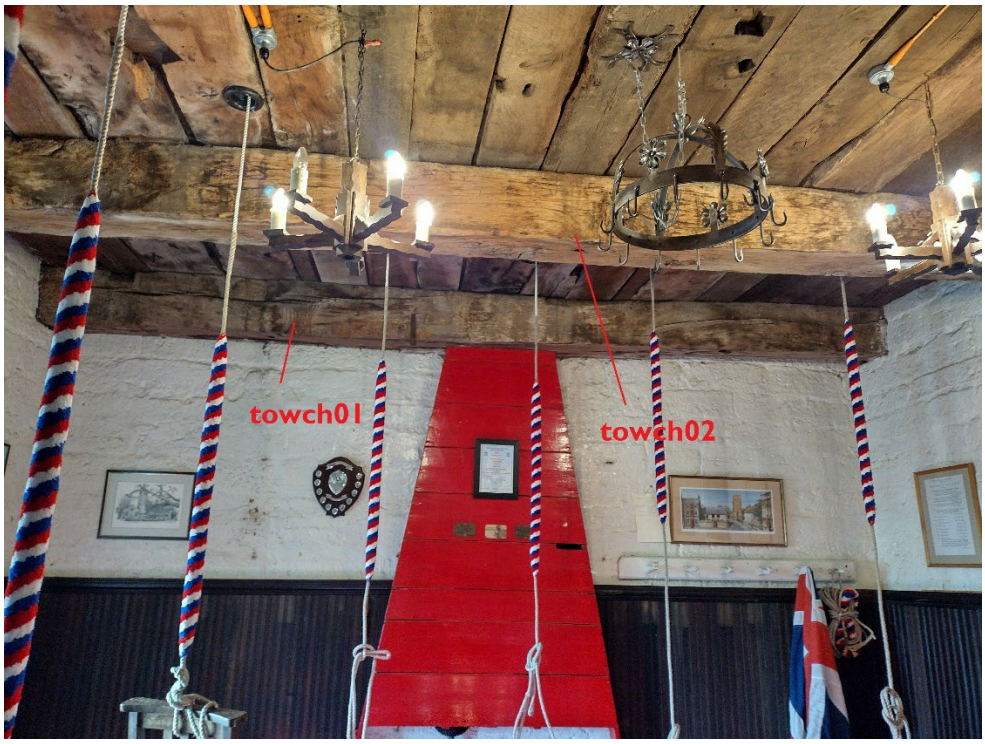

Figure 2: View of the ringing chamber ceiling, looking west, showing the timbers sampled for dendrochronology. [Photo Martin Bridge]

Figure 3: View of the ringing chamber ceiling, looking east, showing the timbers sampled for dendrochronology. [Photo Martin Bridge]

Appendix

Ring width values (0.01mm) for the sequences measured

towcht01

314	165	193	141	204	256	127	179	217	223
288	259	268	249	398	335	506	489	334	368
323	417	379	476	632	431	347	618	628	257
311	301	240	256	276	320	360	420	349	391
454	230	278	358	404	412	332	344	302	315
396	386	399	397	294	441	447	358	356	375
235	313								

towcht02

263	354	229	390	396	387	416	330	446	401
460	600	480	481	518	705	527	572	623	679
508	536	658	476	521	430	556	605	559	471
547	549	563	525	592	541	471	465	602	281
311	301	159	161						

towcht03

548	691	559	564	563	479	658	542	636	608
674	467	585	731	643	574	618	481	415	559
339	252	238	273						

towcht04

198	259	312	261	271	221	305	213	233	152
223	137	176	181	190	173	113	234	356	374
278	231	274	285	290	309	363	325	286	315
230	315	197	237	278	371	259	328	352	352
312	298	292	283						

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