Nottingham Tree-ring Dating Laboratory
Dendrochronology, timber analysis, and historic building consultants

TREE-RING ANALYSIS OF TIMBERS FROM LODGE FARM, STAUNTON HAROLD, LEICESTERSHIRE

A J ARNOLD
R E HOWARD

The Lodge in the Great Park at Staunton Harold
(E.P.Shirley (1873) (Stemmata Shirleiana)

Nottingham Tree-ring Dating Laboratory
Dendrochronology, timber analysis, and historic building consultants

TREE-RING ANALYSIS OF TIMBERS FROM LODGE FARM, STAUNTON HAROLD, LEICESTERSHIRE

A J ARNOLD
R E HOWARD

SUMMARY

Tree-ring analysis of 10 out of 12 samples obtained from the roofs of Lodge Farm (two samples having too few rings) produced a single site chronology, STHDSQ01, this comprising nine samples, and having an overall length of 115 rings. These rings were dated as spanning the years 1533 to 1647.

Interpretation of the samples indicates that all the dated timbers were cut as part of a single programme of felling which was undertaken sometime between 1650 – 55. One sample remains undated.

NTRDL, 20 Hillcrest Grove, Sherwood, Nottingham, NG5 1FT
Telephone 0115 960 3833 (laboratory);
07980 305583 / 07913 427987 (Mobiles)
roberthoward10@hotmail.com
alisonjarnold@hotmail.com

Introduction

Derby Buildings Record 271

This is a double pile timber-framed house of quality (Fig 1a-c), perhaps built for the Keeper of Staunton Harold Great Park in the mid seventeenth century. The elaborate chimneystack and some reused ceiling beams suggest that this house may replace an earlier one on the same site.

The farm lies west of the road from Ashby to Breedon, well back from the road, facing north towards a big range of modern farm buildings. The site lies low and a narrow stream runs in front of the house and may once have flowed round it in the manner of a moat, but if so it was for ornament or drainage, not defence. The house has two full storeys and attics; it is timber framed with much of the north and south walls replaced by brick. Its most striking feature is a large central stone chimneystack crowned with six brick shafts which are linked by a modern brick capping.

The house is built on a chamfered stone plinth, and the north front (Fig 1a) is probably eighteenth century brick laid in Flemish stretcher bond with elliptical window arches. The central front door is protected by a later brick porch with slate benches each side. A wooden door-case frames the six-panelled door and its overlight; the door-case has moulded pilasters surmounted by flat entablature blocks linked by a transom, above which is a moulded cornice. On each side of the door is a three-light window to both the ground and first floor, with two-light windows in each gable. The walls are partly concealed by ivy.

The east wall (Fig 1b) is almost entirely ivy covered; there are two two-light ground floor windows, none to the first floor but a small two-light attic window in the single gable, whose walling is timber-framed with seventeenth century brick infill. In the stone plinth below this is a small cellar window.

The south side of the house has brick walls in the same bond as the front but a lighter colour, partly covered with ivy. There are four equally spaced three-light windows and between them a pair of narrower mock windows, all with stone sills. The chimney rises above the roof ridge a little to the west of centre in stone, with the brick shafts above.

The west side of the house (Fig 1c) has the everyday entrance which is protected by a spacious brick porch, and south of it a utility room, neither of which are drawn on our plan. On this side the timber framing is exposed to view north of the utility room. The sill plate is 24cm above the top of the stone plinth and the framing is in square panels, but at the north end there is some irregularity, possibly to accommodate a first-floor window. At the northwest corner the brick front wall turns to enclose the end of the west wall. In the west gable end of the southern roof range is another small two-light window set in the framing. There is no ivy this side but the adjoining buildings hide a lot of the west wall. The back door is built of narrow vertical planks with three rails behind them, the joints in front covered by moulded battens set into a moulded rail at the top of the door but not at the bottom. On the back is late-nineteenth or twentieth century door furniture except for a pair of harr-hung hinges on

the upper and lower rails. These are strap hinges of seventeenth century design with round ends.

The north front door opens into a north-south passage with a door east into a sitting room with a modern fireplace on the south side (see plan Fig 2). Above the door of this room and along the inside of its west wall is a ceiling beam, and there is a parallel central beam, both boxed in. There is a three-light north window and half of an east window divided by the south wall of the room. Further along the entrance passage on the east side there is an arch leading to a staircase hall lit by the other half of the east window. The stairs go up beside this window and turn west, and under them there are stairs going down to the cellar from the west. Above the cellar door a substantial ceiling beam runs north through the dividing wall and across the ceiling of the north sitting room, where it is boxed,

On the south side of the staircase hall is a larger sitting room with windows south and east. There is a fireplace against the west wall, set in a bolection moulded stone frame painted black, and surmounted by a big stained wooden surround and over-mantel in Jacobean style. There are two boxed-in north-south ceiling beams. The floor joists of the eastern end of this room can be seen in the cellar below, and are sawn softwood set upright and treated with preservative, probably dating between about 1920-1950.

On the west side of the entrance passage towards the south end is a doorway into a back hall for the western entrance to the house. On the north side of this hall is the farm office with a north window. Close to the east end of the office is a north-south beam which lines up with the doorway to the back hall; from the beam another runs west the length of the room. A W.C. has been built in the southwest corner of the office, reached from the back hall.

South from the back hall is the kitchen; the wall separating them is built under a beam and carries a borrowed light for the hall. The kitchen has a big chamfered stone fireplace arch on the east side built of two massive stones in a Tudor arch, with a small cupboard north of it and a larger walk-in cupboard to the south. There is a south window and a ceiling beam with wide chamfers crosses the middle of the room from south to north. In the west wall is a door to the added utility room, and in the northwest corner is a staircase, boxed in and with an understair cupboard reached from the back hall.

At the top of the other, east, staircase is a passage across the first floor to the head of the kitchen stairs. In the outer wall of each staircase a timber post supports a ceiling beam, the other end of both beams resting in the central chimneystack. On the north side of the passage, starting from the east end, there are two bedrooms sharing the three-light north window. Further west are two more rooms, the last being now a bathroom. On the south side of the passage are two larger bedrooms, one on each side of the central chimneystack.

The attics are reached separately from two trapdoors over the landing passage. They are plaster floored and lit by windows in the two north gables and the east and west gables of the south roof range. The roof is built on principal trusses with collars, supporting a set of trenched purlins of massive section; the apex of the east attic roof

is hidden by a ceiling but in the west attic the apex can be seen to be crossed, carrying a ridgepiece.

The cellar lies under only the eastern part of the large south sitting room and has low tiled thralls round the sides. There is an east window. As has been mentioned, the floor joists for the sitting room are replacements of less than a century ago.

Historical development

The name Lodge Farm has been thought to suggest that the house could have been built as a hunting lodge in Staunton Harold Park. According to Cantor and Squires (1997) the Keepers of Breedon medieval Park lived in a lodge, later called Lodge Farm, surrounded by a small moat, and it seems likely that this was the purpose of Staunton Lodge Farm. Its low situation would be unsuitable for a hunting lodge.

The plan, which is two rooms deep, i.e. double pile, was one not in use before the mid-seventeenth century, and a dated example, Mickleover Old Hall, Derby, 1648, is thought to be exceptionally early of its type. The two houses are remarkably similar in plan, Mickleover being slightly smaller. It also has two chimneys whereas Lodge Farm has just one, and it may be that there was originally a hall fireplace into the Lodge chimney as well - if so, that would account for the six flues. There is a question about the original function of the fourth ground floor room; it could have been a service room (dairy or buttery) as it faces north and it has had that function according to a 1950s plan. This would be quite inconvenient since the cellar is at the opposite end of the house. Perhaps the northwest room was not originally separated from the back hall, and the whole space was an office for the Park Keeper.

The house has some wide chamfered ceiling beams - 5cm to 8cm - but these are not pristine as one would expect in a house of this quality so it is possible that they are re-used. There is an anomaly in the wall framing, in that the sill plate does not rest on the stone plinth as it should do and does at Mickleover where the framing is otherwise similar. I cannot explain this but it does mean that the infill was always brick, as it still is high up in the east and west gables - the lower west wall has later replacement bricks. The front hall has been reduced to a passage by taking out of it the northeast sitting room, and by narrowing it on the west side

Some accident appears to have caused damage to the south sitting room, perhaps a flood filling the cellar and rotting the floor joists. The original fire opening is quite plain and I envisage some sort of wooden overmantel like that at Mickleover Old Hall which was added in 1655. The present design is a little overwhelming and may take its inspiration from Staunton Harold church interior timberwork.

Upstairs the north rooms share the three-light windows and the walls that abut on those windows are likely to be alterations. Looking at the 1950's plan, it seems probable there were originally four upstairs rooms, as there are four downstairs, three of which may have been heated. The space between the two northern bedrooms may have been a closet. It was normal up to the late-eighteenth century for bedrooms to be reached one through another, so the east-west passage is a later alteration. In a linen cupboard let into the chimneystack's northwest corner there is

an excessively massive ceiling beam set askew; the cupboard is another alteration and the beam supports a water tank in the attic.

Lodge Farm was sold by the Staunton Harold Estate in 1954 to the sitting tenant who conveyed it soon afterwards to the present owner's father. He retired recently and Mr Robert Bonser came to live here in 2003. He has plans that were made for his father, undated but believed to be between 1954 and 1960. They show thralls round the room that is now the farm office, and Mr Bonser remembers that the walls had efflorescence that was overcome by cladding with plasterboard.

Staunton Harold had two medieval deer parks; one Great Park in the east of the parish and the Little Park near the Hall. Documentary evidence states that Sir Henry Shirley dis-parked the Great Park in 1623. Nichols reports that in 1795 'the Great Park is still so-called though in farming, one of which is called The Lodge'. The Little Park remains to this day, but was reduced in size by the Fifth Earl in the 1760s. It was believed that Lodge Farm was built about 1660, not as a farmhouse but later adapted to that purpose. The framing of the outer walls may have decayed or become unfashionable, as it was replaced in the late-eighteenth century. However, timber framed walls remained on the east (partly) and west though the brick infill has been replaced on that part of the west wall that can be examined.

The 1954-60 plans show that most of the southern half of the house retains its original design but not so the northern half. Downstairs the front entrance hall has been reduced on the west and on the east by dividing off the sitting room. Here a fireplace was built early in the twentieth century with a flue rising over the archway to join the central stack. This replaced a fireplace into the north side of the stack which heated the large original hall. Upstairs there have also been a number of alterations.

It is possible that an earlier house preceded the present one on this site, but if so, the only part of the present house that might remain from an earlier one is the chimneystack. Any sixteenth century house would be one room deep, so could have stood roughly in the position now occupied by the kitchen and main sitting room. The entrance could have been on the south side of the stack into a lobby giving access to both rooms. In favour of this suggestion is the upper part of the chimney whose brick flues have a late-sixteenth century appearance, and the probably reused ceiling beams. As far as can be told from the remains of the timber frame and the plinth, there is no break in the structure which appears consistent with a mid- to late-seventeenth century date. The plan could not be earlier than that.

Sampling

Sampling and analysis by dendrochronology of timbers from Lodge Farm were commissioned as part of a larger programme of research in Staunton Harold parish undertaken by the local heritage group. It is hoped that under the auspices of this group a number of buildings will be dated by dendrochronology and a fuller picture of the parish will be developed. The project has been funded by a grant from the Local Heritage Initiative.

Thus, from the roof timbers available a total of 12 core samples was obtained. Each sample was given the code STH-D (for Staunton Harold, site "D") and numbered 01 –

12. In all cases the timbers sampled appearing to be primary and integral to each other and to be representative of the present building. In this instance timbers with any indication of re-use were not sampled.

The positions of these samples were marked on a sketch plan made at the time of coring, this being reproduced here as Figure 3. Details of the samples are given in Table 1. In this Table, all trusses and the individual timbers have been numbered and/or identified on a north – south, or east – west basis, as appropriate.

The Nottingham Tree-ring Dating Laboratory would like to take this opportunity to thank Robert and Jill Bonser, plus Mr Allan Bonser, for their help and enthusiasm with sampling at Lodge Farm. We would also like to thank Barbara Hutton and Irene Brightmer, not only for the use of their notes in the introduction above and their drawings elsewhere, but also for making arrangements for sampling.

Tree-ring dating

Tree-ring dating relies on a few simple, but quite fundamental, principles. Firstly, as is commonly known, trees (particularly oak trees, the most frequently used building timber in England) grow by adding one, and only one, growth-ring to their circumference each, and every, year. Each new annual growth-ring is added to the outside of the previous year's growth just below the bark. The width of this annual growth-ring is largely, though not exclusively, determined by the weather conditions during the growth period (roughly March – September). In general, good conditions produce wider rings and poor conditions produce narrower rings. Thus, over the lifetime of a tree, the annual growth-rings display a climatically influenced pattern. Furthermore, and importantly, all trees growing in the same area at the same time will be influenced by the same growing conditions and the annual growth-rings of all of them will respond in a similar, though not identical, way.

Secondly, because the weather over any number of consecutive years is unique, so too is the growth-ring pattern of the tree. The pattern of a short period of growth, 20, 30 or even 40 consecutive years, might conceivably be repeated two or even three times in the last one thousand years. A short pattern might also be repeated at different time periods in different parts of the country because of differences in regional micro-climates. It is less likely, however, that such problems would occur with the pattern of a longer period of growth, that is, anything in excess of 54 years or so. In essence, a short period of growth, anything less than 54 rings, is not reliable, and the longer the period of time under comparison the better.

The third principle of tree-ring dating is that, until the early- to mid-nineteenth century, builders of timber-framed houses usually obtained all the wood needed for a given structure by felling the necessary trees in a single operation from one patch of woodland, or from closely adjacent woods. Furthermore, and contrary to popular belief, the timber was used "green" and without seasoning, and there was very little long-term storage as in timber-yards of today. This fact has been well established from a number of studies where tree-ring dating has been undertaken in conjunction with documentary studies. Thus, establishing the felling date for a group of timbers gives a very precise indication of the date of their use in a building.

Tree-ring dating relies on obtaining the growth pattern of trees from sample timbers of unknown date by measuring the width of the annual growth-rings. This is done to a tolerance of 1/100 of a millimeter. The growth patterns of these samples of unknown date are then compared with a series of reference patterns or chronologies, the date of each ring of which *is* known. When the growth-ring sequence of a sample "cross-matches" repeatedly at the same date span against a series of different relevant reference chronologies the sample can be said to be dated. The degree of cross-matching, that is the measure of similarity between sample and reference, is denoted by a "*t*-value"; the higher the value the greater the similarity. The greater the similarity the greater is the probability that the patterns of samples and references have been produced by growing under the same conditions *at the same time*. The statistically accepted fully reliable minimum *t*-value is 3.5.

However, rather than attempt to date each sample individually it is usual to first compare all the samples from a single building, or phase of a building, with one another, and attempt to cross-match each one with all the others from the same phase or building. When samples from the same phase do cross-match with each other they are combined at their matching positions to form what is known as a "site chronology". As with any set of data, this has the effect of reducing the anomalies of any one individual (brought about in the case of tree-rings by some non-climatic influence) and enhances the overall climatic signal. As stated above, it is the climate that gives the growth pattern its distinctive pattern. The greater the number of samples in a site chronology the greater is the climatic signal of the group and the weaker is the non-climatic input of any one individual.

Furthermore, combining samples in this way to make a site chronology usually has the effect of increasing the time-span that is under comparison. As also mentioned above, the longer the period of growth under consideration, the greater the certainty of the cross-match. Any site chronology with less than about 55 rings is generally too short for reliable dating.

Having obtained a date for the site chronology as a whole, the date spans of the constituent individual samples can then be found, and from this the felling date of the trees represented may be calculated. Where a sample retains complete sapwood, that is, it has the last or outermost ring produced by the tree before it was cut, the last measured ring date is the felling date of the tree.

Where the sapwood is not complete it is necessary to estimate the likely felling date of the tree. Such an estimate can be made with a high degree of reliability because oak trees generally have between 15 to 40 sapwood rings. For example, if a sample with, say, 12 sapwood rings has a last sapwood ring date of 1400, it is 95% certain that the tree represented was felled sometime between 1403 (1400+3 sapwood rings (12+3=15)) and 1428 (1400+28 sapwood rings (12+28=40)).

Given that in a timber-framed building the trees required for each phase are almost certainly to have been cut in a single felling operation especially for that building, it is usual to calculate the average date of the heartwood/sapwood boundary from *all* the dated samples from each phase of a building and add 15 to 40 rings to this average to get the likely overall felling date of all the timbers used. In this calculation, wide variations in the position/date of the heartwood/sapwood boundary (possibly suggesting different felling dates) must be noted and taken into consideration.

Analysis

In the case of the 12 samples obtained from Lodge Farm, each was prepared by sanding and polishing. It was seen at this time that two samples, STH-D03 and D09, had less than 54 rings, too few for reliable dating, and they were rejected from this programme of analysis. The annual growth-ring widths of the remaining 10 samples were, however, measured, and were then compared with each other.

At a minimum value of *t=3.6* a single group comprising nine samples could be formed, cross-matching with each other at the positions indicated in the bar diagram, Figure 4. The nine cross-matching samples were combined at these indicated off-set positions to form a site chronology, STHDSQ01, with an overall length of 115 rings. Site chronology STHDSQ01 was then satisfactorily dated by repeated and consistent comparison with a number of relevant reference chronologies for oak as spanning the years 1533 to 1647. The evidence for this dating is given in the *t*-values of Table 2.

Site chronology STHDSQ01 was then compared with the single remaining measured samples, STH-D11, but there was no further satisfactory cross-matching. Sample STH-D11was then compared individually with the full range of reference chronologies but there was, again, no further cross-matching and this sample must, therefore, remain undated.

Interpretation and conclusion

Analysis by dendrochronology of 10 measured samples from the roofs of Lodge Farm has resulted in nine of these being combined to form a single site chronology, STHDSQ01. This site chronology is 115 rings long, these rings being satisfactorily dated as spanning the years 1533 – 1647.

Although some of the sampled timbers do have complete sapwood, and possibly bark, on them, this could not be retained on the samples, small portions of the sapwood being lost during coring. It is thus not possible to determine a precise felling date for the timbers with reliability. However, the amount of lost core was noted at the time of sampling and this, along with the relative position of the heartwood/sapwood boundary, makes it possible to calculate a likely felling date range. In this case it is estimated that all the dated timbers of the roof were cut as part of a single programme of felling which is likely to have taken place some time between 1650 and 1655.

Bibliography

Arnold, A J, Howard, R E, Litton, C D, and Dawson, G 2005 – The Tree-ring Dating of a Number of Bellframes in Leicestershire, Centre for Archaeol Rep **5/2005**

Arnold, A J, Howard, R E, Laxton, R R, and Litton, C D, forthcoming *Tree-ring analysis of timbers from The Moat House, Appleby Magna, Leicestershire,* Centre for Archaeol Rep

Baillie, M G L, and Pilcher, J R, 1982 unpubl A master tree-ring chronology for England, unpubl computer file *MGB-EOI,* Queens Univ, Belfast

Cantor, L and Squires, A, 1997, The Historic Parks and Gardens of Leicestershire and Rutland – Kairos Press

Derby Buildings Record No.59 – Mickleover Old Hall

Derby Buildings Record No.271 – Lodge Farm

Fletcher, J, 1978 unpubl computer file MC10---H

Howard, R E, Laxton, R R, and Litton, C D, 1999 *Tree-ring analysis of timbers from Bretby Hall, Bretby, Derbyshire,* Anc Mon Lab Rep **43/1999**

Howard, R E, Laxton, R R, and Litton, C D, forthcoming *Tree-ring analysis of timbers from the Riding School, Bolsover Castle, Bolsover, Derbyshire,* Centre for Archaeol Rep

Laxton, R R, and Litton, C D, 1988 An East Midlands master tree-ring chronology and its use for dating vernacular buildings, University of Nottingham, Dept of Classical and Archaeol Studies, Monograph Series, **III**

Nichols, J (1795 – 1811) The History and Antiquities of the County of Leicestershire

Siebenlist-Kerner, V, 1978 *Chronology, 1341-1636, for hillside oaks from Western England and Wales*, in Dendrochronology in Europe (ed J M Fletcher), BAR Int Ser, **51**, 295 – 301

Table 1: Details of tree-ring samples from Lodge Farm, Staunton Harold, Leicestershire

Sample number	Sample location	Total rings	Sapwood rings*	First measured ring date (AD)	Last heartwood ring date (AD)	Last measured ring date (AD)
STH-D01	East purlin, truss 1 – 2	94	3	1539	1629	1632
STH-D02	West purlin, truss 1 – 2	98	18	1549	1628	1646
STH-D03	East principal rafter, truss 2	nm	---	------	------	------
STH-D04	East principal rafter, truss 3	85	h/s	1546	1630	1630
STH-D05	West principal rafter, truss 3	98	h/s	1538	1635	1635
STH-D06	East purlin, truss 3 – 4	85	h/s	1550	1634	1634
STH-D07	West purlin, truss 3 – 4	114	9	1534	1639	1647
STH-D08	South purlin truss 5 – 6	90	13	1545	1621	1634
STH-D09	North principal rafter, truss 6	nm	---	------	------	------
STH-D10	South principal rafter, truss 6	88	no h/s	1535	------	1622
STH-D11	North infill purlin to truss 8	79	no h/s	------	------	------
STH-D12	South purlin truss 8 – 9	114	14	1533	1632	1646

*h/s = The last ring on the sample is at the heartwood/sapwood boundary

nm = sample not measured

Table 2: Results of the cross-matching of site chronology STHDSQ01 and relevant reference chronologies when the first-ring date is 1533 and the last-ring date is 1647

Reference chronology	*t*-value	Reference
East Midlands Master Chronology	9.6	(Laxton and Litton 1988)
Bolsover Castle (riding house), Derbys	8.8	(Howard *et al* forthcoming)
Bretby Hall, Bretby Derbys	8.8	(Howard *et al* 1999)
Church of St Andrew, Welham, Leics	8.1	(Arnold *et al* 2005)
Moat House, Appleby Magna, Leics	8.0	(Arnold *et al* forthcoming)
England Master chronology	6.8	(Baillie and Pilcher 1982 unpubl)
MC10---H	5.1	(Fletcher 1978)
Wales and West Midlands	5.1	(Siebenlist-Kerner 1978)