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Summary

The stylistic evidence for the clasped purlin and queen strut, windbraced roof suggests a late sixteenth-century date for present building, this being supported by documantary evidence that the house was occupied in AD 1597. There was some uncertainity as to whether the timber-framed staircase, forming a rear external unit, was coeval with the roof. The dendrochronological evidence supports the interpretation that the staircase and roof are indeed broadly contemporaneous. If taken as two groups of timbers, the roof timbers were most likely felled in the period **AD 1579-97** and the staircase timbers in the period **AD 1578-1609**. Although none of the samples retained the sapwood-bark boundary, this was present on several timbers at the time of sampling, and little wood was lost during coring. It is therefore most likely that the roof and staircase were constructed in the earlier parts of the quoted ranges. The lack of complete sapwood and bark do not make it possible to tell whether the two groups of timbers are exactly contemporaneous, although this seems a likely scenario.

Keywords

Dendrochronology
Standing Building

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TREE-RING ANALYSIS OF TIMBERS FROM GUNTONS FARMHOUSE, GARVESTONE, NORFOLK

Introduction

Guntons Farmhouse (NGR TG 01590690; Fig 1) is a former manor house, thought on stylistic grounds to date to the late-sixteenth century. The roof is of the clasped purlin and queen strut construction with windbracing. It is a grade II* listed building on the English Heritage Buildings at Risk register, and is currently undergoing a programme of grant-aided repairs. Dendrochronological dating was requested by Trudi Hughes (English Heritage Historic Buildings architect) in order to inform the repair programme. It was hoped that the investigation would provide a date for the construction of the roof, and establish whether or not the staircase was coeval with the roof, and thus help to understand the chronological development of the building.

The will of Christopher Thwaites (Norfolk Record Office) written in September AD 1597 mentions "the house wherein I now dwell sometime called Guntons", which, given the style of the roof, appears to confirm the presence of the existing building by that date.

Methodology

The site was visited in November AD 2000. The timbers were assessed for their potential use in dendrochronological study. Oak timbers which appeared to have more than 50 rings, traces of sapwood, and accessibility were the main considerations in the initial assessment. For the purposes of this study, the roof and staircase were treated as two different phases and sufficient samples were taken from each to try and establish the felling dates for both phases. Those timbers judged to be potentially useful were cored using a 15mm auger attached to an electric drill. The cores were glued to wooden laths, labelled, and stored for subsequent analysis.

The cores were prepared for measuring by sanding using an electric belt-sander with progressively finer grit papers down to 400 grit. Any further preparation necessary, eg where bands of narrow rings occurred, was done manually. Suitable samples had their tree-ring sequences measured to an accuracy of 0.01 mm using a specially constructed system utilizing a binocular microscope with the sample mounted on a travelling stage with a linear transducer linked to a PC. The software used in measuring and subsequent analysis was written by Ian Tyers (1999a).

Ring sequences were plotted to allow visual comparisons to be made between sequences on a light table. This activity also acts as a measure of quality control in identifying any errors in the measurements when the samples crossmatch. Statistical comparisons were made using Student's *t*-test (Baillie and Pilcher 1973; Munro 1984). The *t*-values quoted below were derived from the original CROS program (Baillie and Pilcher 1973). Those *t*-values in excess of 3.5 are taken to be indicative of acceptable matching positions provided that they are supported by satisfactory visual matches, and give consistent matching positions.

When crossmatching between samples is found, their ring-width sequences are meaned to form an internal 'working' site mean sequence. Other samples may then be incorporated after comparison with this 'working' master until a final site sequence is established, which is then compared with a number of reference chronologies (multi-site chronologies from a region) and

Table 1: Oak (*Quercus* spp.) timbers sampled from Guntons Farmhouse, Garveston, Norfolk. h/s = heartwood-sapwood boundary

Sample number	Origin of core	Total no of years	Average growth rate (mm yr^{-1})	Sapwood details	Date of sequence AD	Felling date of timber AD
GUN01	Principal rafter 5 south	72	1.93	22	1508 - 79	1579 - 98
GUN02	Queen post 5 south	43	2.73	h/s	undated	unknown
GUN03	Common rafter 6 south, bay 4	55	1.91	2	1504 - 58	1565 - 97
GUN04	Principal rafter 5 north	72	1.63	18	1508 - 78	1578 - 1601
GUN05	Principal rafter 1 north	48	2.35	h/s (+ 11 sap)	1511 - 58	1569 - 99
GUN06	Lower purlin, bay 1 north	34	not measured	h/s	undated	unknown
GUN07	Principal rafter 1 south	65	1.84	20	1513 - 77	1578 - 98
GUN08	Collar, truss 1	31	not measured	15 separate	undated	unknown
GUN09	Principal rafter 2 north	76	2.17	-	undated	unknown
GUN10	Queen post 3 north	28	not measured	h/s	undated	unknown
GUN11	Staircase north-west post	61	2.47	6	1515 - 75	1578 - 1610
GUN12	Staircase west mid rail	<40	not measured	-	undated	unknown
GUN13	Staircase north-east post	50	2.83	7	1526 - 75	1577 - 1609
GUN14	Staircase south-west post	37	not measured	4	undated	unknown
GUN15	Stair tread	84	2.03	-	undated	unknown
GUN16	Staircase east sill	41	not measured	-	undated	unknown
GUN17	Staircase east mid rail	<40	not measured	-	undated	unknown

dated individual site masters in an attempt to date it. Individual long series which are not included in the site mean(s) are also compared with the database to see if they can be dated.

The dates thus obtained represent the time of formation of the rings available on each sample. Interpretation of these dates then has to be undertaken to relate these findings to the construction date of the phase under investigation. An important aspect of this interpretation is the estimate of the number of sapwood rings missing. In this instance, the sapwood estimates are based on those proposed for this area by Miles (1997), in which 95% of samples are likely to have from 9 to 41 sapwood rings. Where bark is present on the sample the exact date of felling of the tree used may be determined.

The dates derived for the felling of the trees used in construction do not necessarily relate directly to the date of construction of the building. However, evidence suggests that, except in the re-use of timbers, construction in most historical periods took place within a very few years after felling (Salzman 1952; Hollstein 1965).

Results

All the timbers sampled were oak (*Quercus* spp.). Details of the samples and their origins within the building are given in Table 1, and illustrated in Figures 2 - 3. A number of the ring-width series crossmatched with each other (Table 2) and were combined into a single 76-year long site chronology, GUNTONS. The relative positions of overlap of the individual timbers is represented in Figure 4. The site chronology was then dated by comparison with a wide range of reference chronologies, the best results being presented in Table 3. The ring-width data for the site chronology is given in Table 4.

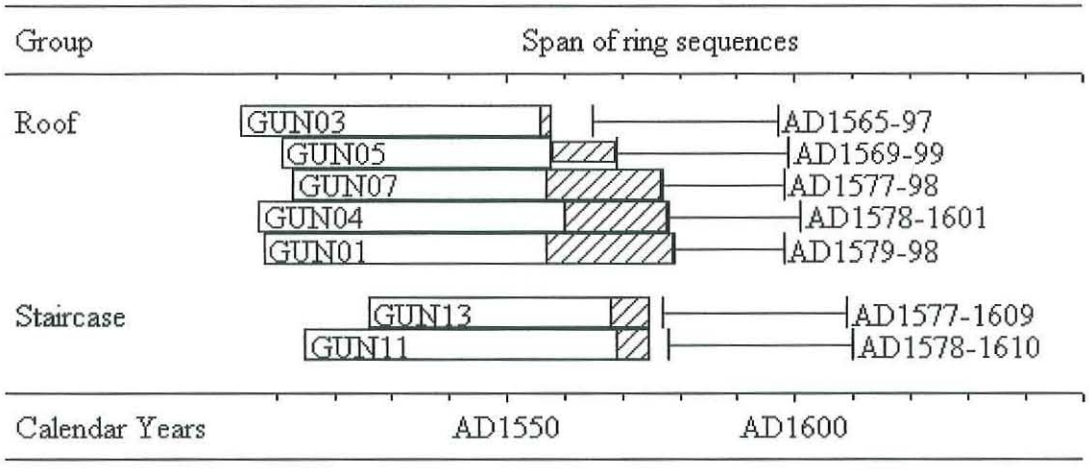

Figure 4: Bar diagram showing the relative positions of overlap of the dated timbers from Guntons Farmhouse, Garvestone, Norfolk. Hatched areas represent sapwood, the narrow hatched bar represents unmeasured sapwood rings, and felling date estimates are added, as described in the text. The locations are separated to emphasize the possible date difference in the two groups of timbers

Table 2: Crossmatching between the dated timbers in the site chronology GUNTONS.

(-) represents *t*-value less than 3.0.

	***t*-values**					
SAMPLE	**GUN03**	**GUN04**	**GUN05**	**GUN07**	**GUN11**	**GUN13**
GUN01	3.3	7.0	5.0	4.7	3.6	3.9
GUN03		4.5	4.4	-	-	-
GUN04			5.1	5.4	4.6	4.2
GUN05				6.2	-	-
GUN07					-	4.0
GUN11						6.9

Table 3: Dating evidence for the site chronology GUNTONS

	GUNTONS AD 1504-79	
Dated reference or site master chronology	*t*-value	Overlap (yrs)
East Midlands (Laxton and Litton 1988)	5.7	76
London1175 (Tyers pers comm)	5.3	76
Fawsley, Northamptonshire (Howard *et al* 1999)	7.2	72
Paston, Norfolk (Tyers 1999b)	6.4	65
Warborough, Oxfordshire (Haddon-Reece *et al* 1989)	5.7	71
Catesby, Northamptonshire (Bridge 2000)	5.2	76
Clayton Hall, Lancashire (Leggett 1980)	5.1	76
Peel Hall, Greater Manchester (Leggett 1980)	5.1	76
Newdigate2, Surrey (Bridge 1998)	5.1	76

Table 4: Ring-width data for the chronology GUNTONS

Year	**ring widths (0.01mm)**										**no of samples**									
AD1504				242	250	303	272	274	354	343			1	1	1	2	3	3	3	
	382	324	321	241	260	306	262	356	286	228	4	4	5	5	6	6	6	6	6	6
	271	299	207	221	198	236	207	210	170	141	6	6	6	6	6	7	7	7	7	7
	224	203	196	186	219	227	223	184	230	270	7	7	7	7	7	7	7	7	7	7
	190	147	180	159	208	184	213	260	257	220	7	7	7	7	7	7	7	7	7	7
AD1551	193	184	187	167	173	182	130	197	216	201	7	7	7	7	7	7	7	7	5	5
	172	158	162	129	136	147	160	201	181	200	5	5	5	5	5	5	5	5	5	5
	163	170	163	164	158	74	100	98	78		5	5	5	5	5	3	3	2	1	

Interpretation and Discussion

The seven dated timbers come from both the main roof and the staircase. They may form a single group, with a likely felling period of AD 1579-97. However, the lack of complete sapwood and bark, coupled with the slightly late sapwood dates of the staircase timbers, mean that it is not possible to say from the dendrochronological evidence alone that the two structures are exactly contemporaneous. Indeed based on the few dated timbers, there is a suggestion that the timbers used in the staircase could have been felled a little later, during the period AD 1578-1609. Some timbers retained complete sapwood (eg GUN 01, 04, and 07) but marks made on the sapwood/bark boundary before sampling were not evident on sample, suggesting that one or more outer rings were lost on sampling. Given the care and attention paid to trying to retain complete sapwood and the notes about sapwood retention taken at the time of sampling, it is felt likely that the actual felling date of the timbers is more likely to be at the start of the quoted ranges, rather than at the end of them. This is supported by the documentary evidence cited above which suggests the house was being lived in by AD 1597.

The site chronology gives consistent matches against site chronologies from a wide geographical area, the strongest match being found against Fawsley Hall, Northamptonshire, (Howard *et al* 1999) some 150km to the west, and the second strongest against Paston, Norfolk (Tyers 1999b), under 50km to the north-east. A chronology from Lower Catesby, Northamptonshire (Bridge 2000), within 10km of Fawsley Hall gives a weaker match than sites from Lancashire and Greater Manchester. It is not clear therefore where the original source of the timber was, although it could well be local to the house in origin.

Acknowledgements

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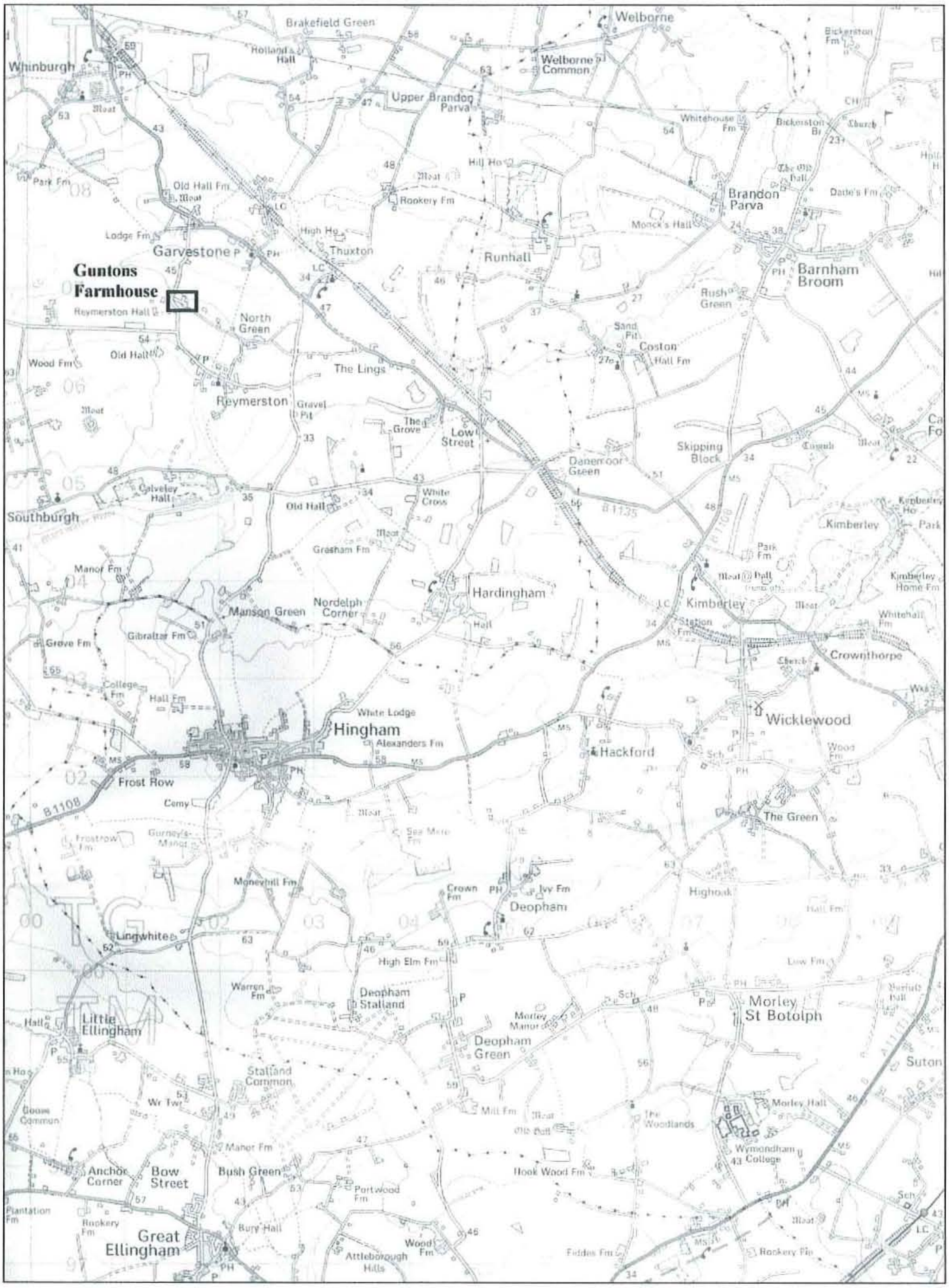

Figure 1: Map to show the general location of Guntons Farmhouse, Garvestone, Norfolk

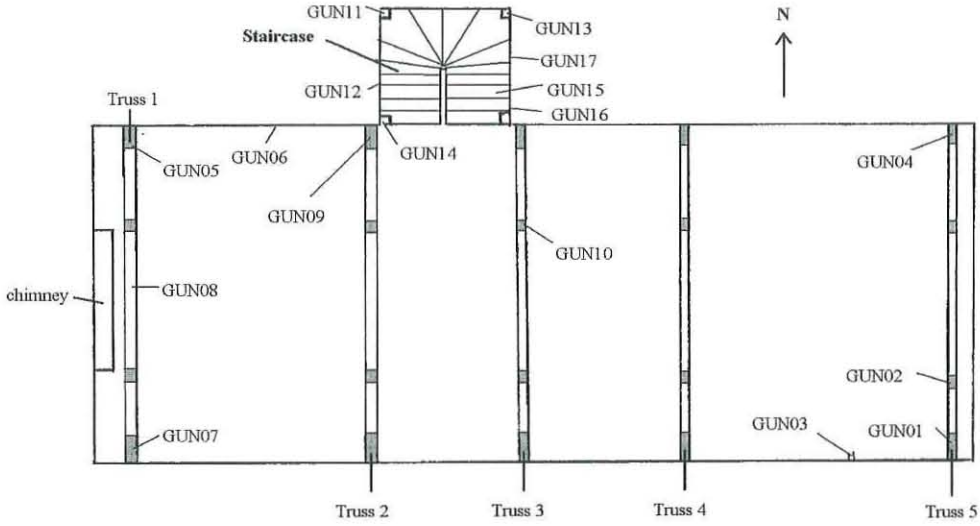

Figure 2: Sketch plan of the roof and staircase of Guntons Farmhouse, Garvestone, Norfolk, showing the approximate locations of samples taken for dendrochronology

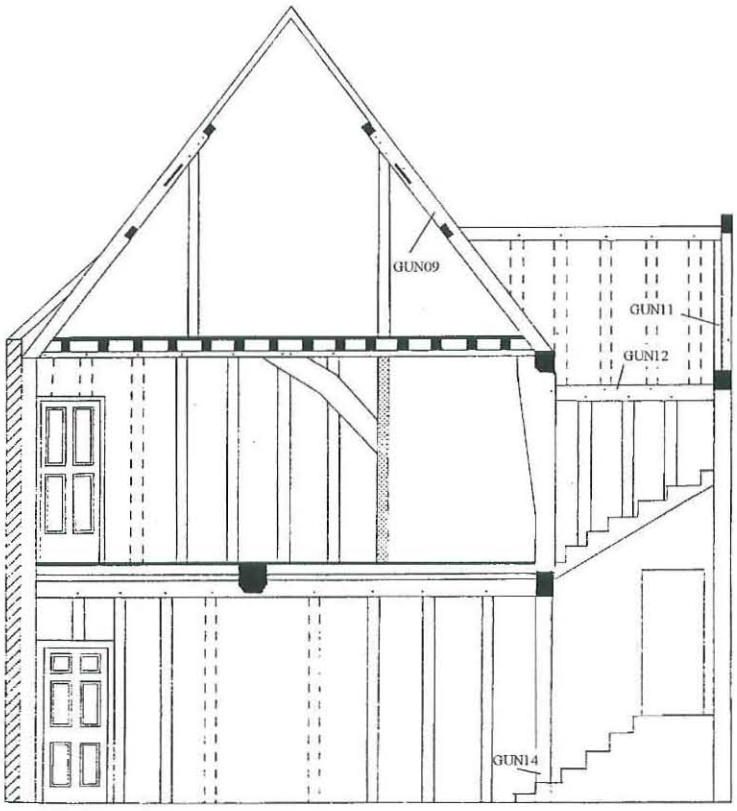

Figure 3: Cross-section of the house showing the form of the roof trusses (in this instance Truss 2) and locations of some of the samples taken for dendrochronology. Adapted from an original drawing supplied by Vicki Wallis