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**Tree-Ring Analysis of Timbers from Stubley Old Hall,  
Featherstall Road, Littleborough, Greater Manchester**

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## **Tree-Ring Analysis of Timbers from Stubley Old Hall, Featherstall Road, Littleborough, Greater Manchester**

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### **Summary**

Timbers from two areas of this grade II\* listed building were investigated. The ceiling timbers from the ground-floor north-west room, thought to have been re-used from the room above, could not be dated. Few timbers had sufficient rings, and those sampled were found to be fissured. The timbers of the remaining primary cruck in the south wing, and its associated elements were also sampled. Four series of datable ring-width sequences were obtained, but they did not match each other. The timber forming the southern purlin was felled in the spring/summer of AD 1491 and the east windbrace was possibly felled in AD 1487. The ridge piece and northern cruck blade gave felling date ranges consistent with these dates. This late-fifteenth century date is consistent with the dating of the cruck on stylistic grounds.

### **Keywords**

Dendrochronology  
Standing Building

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## **Introduction**

Stubble Old Hall (NGR SD 928 161; Fig 1) is a grade II\* listed building which consists of a two storey H-shaped timber-framed house which was later rebuilt in stone. The two-storey cruck-framed southern wing is late medieval in date (Nevell and Hradil 2002), but was refaced in brick in the late seventeenth, or early eighteenth century. One of the three original cruck frames remains towards the western end of this wing (Figs 2 and 3). The open hall is thought to have been rebuilt in stone, possibly around AD 1529 (Nevell and Hradil 2002). The building underwent extensive alteration in the late twentieth century, when much of the original early fabric was removed. A ceiling in the ground-floor north-west room (Fig 3) is thought to have been moved from the room above, where a single beam of similar moulding remains.

The local English Heritage inspector (Marion Barter) requested this study to establish a date for the remaining primary cruck in the south wing, and to date the ceiling in the north-west room, thus adding to the understanding of the chronological development of the building, and to inform listed building consent for proposed works at the site.

## **Methodology**

The site was visited in June AD 2003. Oak timbers with more than 50 rings, traces of sapwood, and accessibility were the main considerations in the initial assessment. 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 meant 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 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 12 to 45 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).

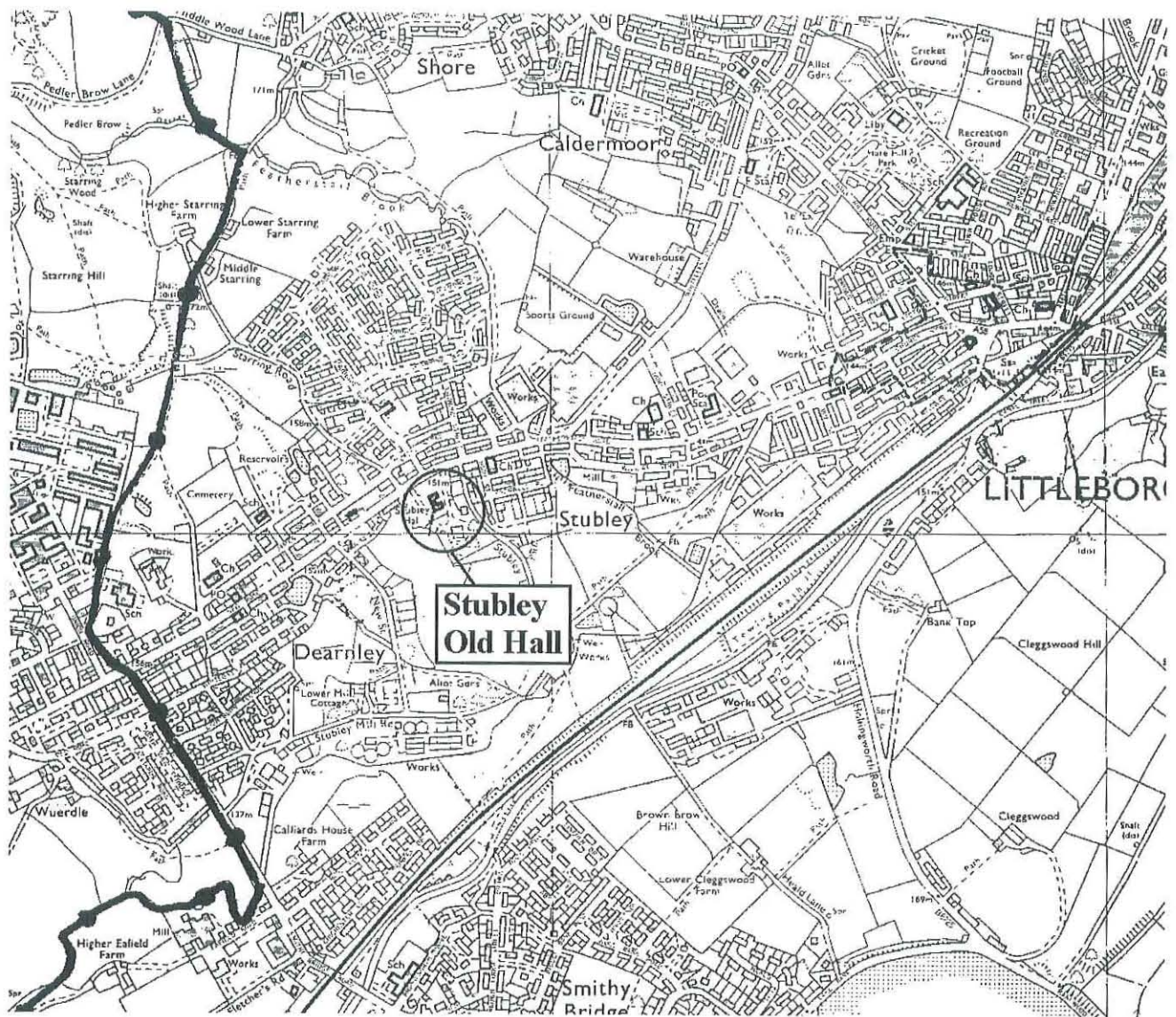
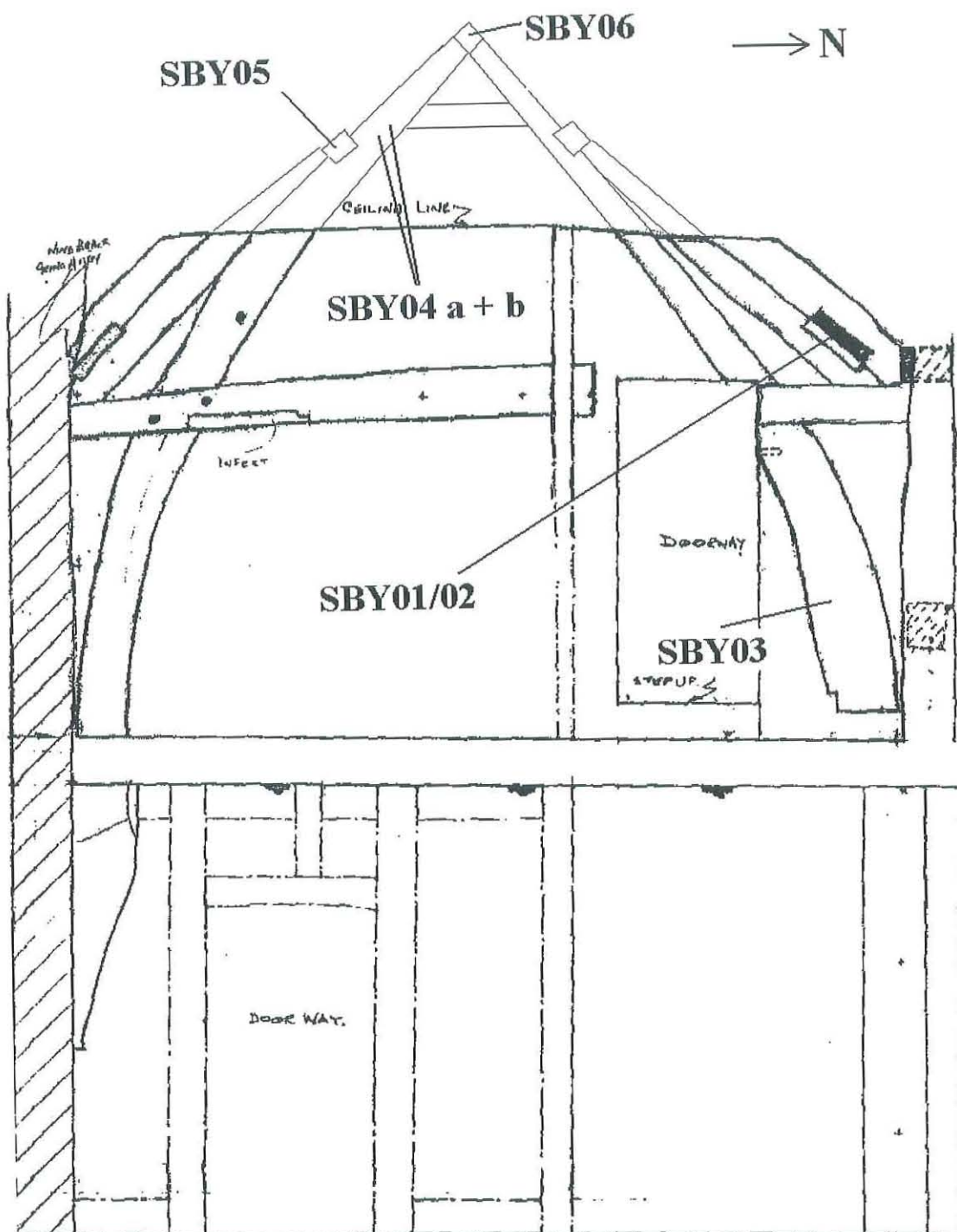
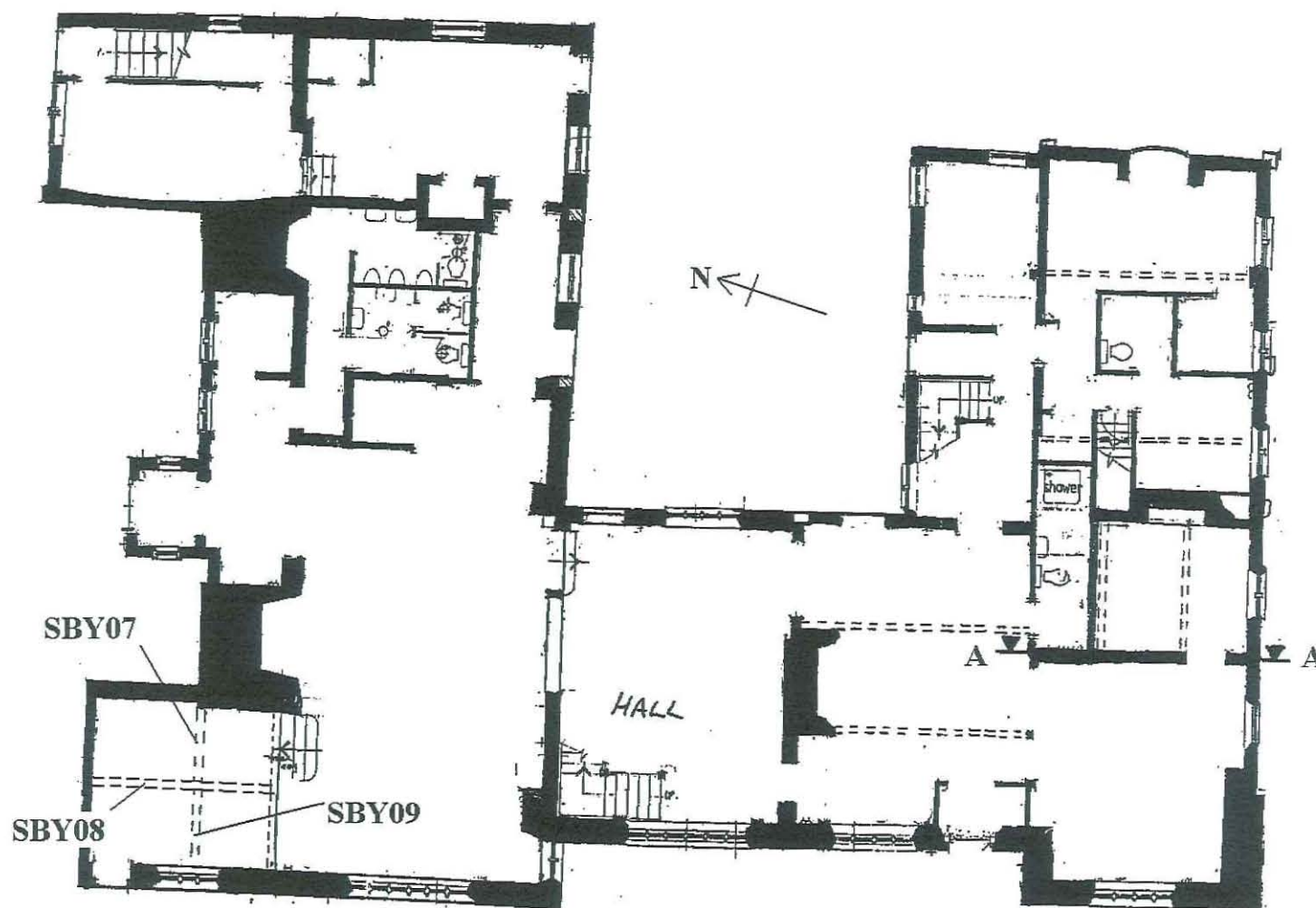


Figure 1: Map showing the general location of Stubble Old Hall



**Figure 2:** Drawing of the remaining cruck in the south wing up to ceiling level (based on Fig 39; Nevell and Hradil 2002) adapted to show a sketch of the above ceiling elements and the approximate locations of samples taken for dendrochronology





**Figure 3:** Ground floor plan of Stubby Old Hall showing the position of the cruck in the south wing (A-A) and the locations of samples from the floor beams discussed in the text, adapted from an original drawing in Nevell and Hradil 2002

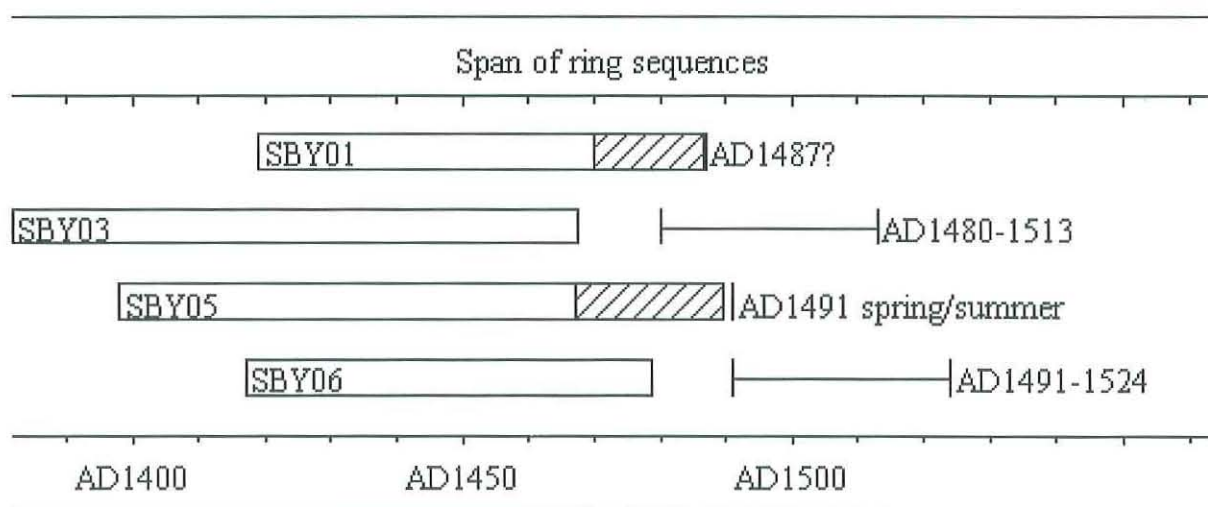
## Results

All the timbers investigated were of oak (*Quercus* spp.). The initial assessment of the cruck frame in the southern wing suggested that relatively few timbers were available with sufficient rings for dating, but that those timbers that were accessible might be sufficient to derive a date. Sampling was thus carried out, including the windbraces, which looked to be later additions, but which were specifically mentioned in the dendrochronological brief.

The ceiling of the first-floor north-west room appears to have been rebuilt, but includes a single beam of the original ceiling, distinguished by its moulding. This beam was judged as having too few rings to be datable. The ceiling to ground-floor room below had three beams with sufficient rings that they were thought to be potentially datable, although it was noted that no sapwood was evident on any of these timbers. All the joists had insufficient rings to be dated. Sampling was carried out on the three beams, but the wood was found to be fissured, and no intact cores were derived from this ceiling. The longest core fragment (SBY08) yielded only 50 rings.

The location of samples and basic data are presented in Table 1. One timber (SBY02) from the cruck frame timbers was rejected as having too few rings. The south cruck blade had bark on the timber. When the first core from this timber was extracted (SBY04a) the sapwood disintegrated and the core had only 46 rings. As this timber was potentially so valuable, retaining full sapwood to the bark, a second core (SBY04b) was extracted. The sapwood on this core also turned to powder on coring, with a single sapwood ring being retained on the core. The two series matched each other ( $t = 7.4$ , 43 years overlap) and were combined into a single sequence representing this timber (Table 1).

No acceptable crossmatching was found between any of the timbers from the cruck frame, and each of the measured series was compared with the database of multi-site regional, and individual site chronologies. Four timbers, SBY 01, 03, 05, and 06, gave acceptable consistent matches against a wide range of chronologies (Tables 2 - 5) and were thus dated. Their relative positions of overlap are shown in Figure 4. The series were combined into a single site chronology, STUBLEY, which dated to the period AD 1382-1490 (Table 6), the data for which are presented in Table 7



**Figure 4:** Relative positions of overlap of the dated samples from Stubble Old Hall, showing their interpreted felling date ranges



**Table 1:** Oak (*Quercus* spp.) timbers sampled from Stubley Old Hall. h/s represents the heartwood-sapwood boundary, figures in brackets represent additional unmeasured rings, C represents complete sapwood, and ½C represents complete sapwood with spring vessels of the next growing season present

Sample number	Origin of core	Total no of years	Average growth rate (mm yr <sup>-1</sup> )	Sapwood details	Date of sequence AD	Felling date of timber AD
<b>South cruck</b>						
SBY01	East windbrace on north side of cruck	69	1.21	17 (C?)	1419 - 87	1487?
SBY02	West windbrace on north side of cruck	c33	unmeasured	-	undated	unknown
SBY03	North cruck blade	87	2.34	h/s	1382 - 1468	1480 - 1513
SBY04a	South cruck blade	46	1.93	-	undated	unknown
SBY04b	South cruck blade	46	1.93	1	undated	unknown
SBY04m	South cruck blade	49	1.93	1	undated	unknown
SBY05	South purlin	93	1.08	23+ ½C	1398 - 1490	Spring/Summer 1491
SBY06	Ridge piece	63	2.50	h/s	1417 - 79	1491 - 1524
<b>Floor in North range</b>						
SBY07	East beam	c52*	unmeasured	-	undated	unknown
SBY08	North-south beam	50	1.87	-	undated	unknown
SBY09	West beam	c51*	unmeasured	-	undated	unknown

\*cores fractured in several places

**Table 2:** Dating of the oak sample SBY01

		<b>SBY01</b> <b>AD 1419 - 87</b>	
<b>Dated reference or site master chronology</b>	<b>Dates spanned (AD)</b>	<b><i>t</i>-value</b>	<b>Overlap (yrs)</b>
Wickenby, Lincolnshire (Tyers pers comm)	1398-1493	5.4	68
Sawley, Lancashire (Tyers 2000a)	1433-1506	5.4	55
Reigate Priory, Surrey (Bridge forthcoming)	1384-1545	5.2	68
Erlescote, Wiltshire (Bridge 2000)	1385-1499	5.1	68
Peterborough, Cambridgeshire (Tyers 1998)	1344-1461	5.0	43
Central Tower, York, Yorkshire (Hillam pers comm)	1214-1462	4.9	44
Spalding, Lincolnshire (Bridge 2001)	1380-1477	4.7	59
Marriot's, King's Lynn, Norfolk (Tyers 1999b)	1310-1583	4.7	68
Victoria Wharf, London (Tyers pers comm)	1410-1585	4.6	68
Worfield, Shropshire (Miles and Worthington 1997)	1394-1486	4.5	67

\* denotes single timber rather than a site chronology

**Table 3:** Dating of the oak sample SBY03

		<b>SBY03</b> <b>AD 1382 - 1468</b>	
<b>Dated reference or site master chronology</b>	<b>Dates spanned (AD)</b>	<b><i>t</i>-value</b>	<b>Overlap (yrs)</b>
Belfast (Baillie 1977)	1001-1970	4.8	87
Salop95 (Miles pers comm)	881-1745	4.5	87
Lathom5, Lancashire (Nayling 2000a)	1369-1465	6.2	84
MDB-A12*, Leicestershire (Howard <i>et al</i> 1999)	1393-1467	5.6	75
Elstead, Surrey (Tyers 2000b)	1396-1591	5.2	73
Stayley, Greater Manchester (Leggett 1980)	1365-1554	4.9	87
Bayton, Worcestershire (Bridge 1996)	1348-1525	4.9	87
Broomham, Devon (Tyers <i>et al</i> 1997)	1370-1464	4.9	83
Plowden2, Shropshire (Miles and Haddon-Reece 1993)	1330-1453	4.8	72
Apethorn, Lancashire (Tyers 1999)	1379-1512	4.7	87
Taunton Hall, Lancashire (Bridge 2003a)	1401-95	4.4	68

\* denotes single timber rather than a site chronology

**Table 4:** Dating of the oak sample SBY05

		<b>SBY05</b> <b>AD 1398 - 1490</b>	
<b>Dated reference or site master chronology</b>	<b>Dates spanned (AD)</b>	<b><i>t</i>-value</b>	<b>Overlap (yrs)</b>
British Isles (Pilcher and Baillie pers comm)	404-1981	5.5	93
East Midlands (Laxton and Litton 1988)	882-1981	4.6	93
Wales97 (Miles pers comm)	404-1981	4.3	93
Penrith, Cumbria (Arnold <i>et al</i> 2003)*	1408-1469	6.5	62
Old Worden, Lancashire (Bridge 2003b)	1415-1531	5.6	76
Deardon, Greater Manchester (Nayling and Tyers 1998)	1397-1488	5.5	91
Stayley, Greater Manchester (Leggett 1980)	1365-1554	5.4	93
Aydon Castle, Northumberland (Hillam and Groves 1991)	1424-1543	4.8	67
Alcaston, Shropshire (Miles and Worthington 1998)	1389-1556	4.6	93
Hurstwood, Lancashire (Nayling 1998)	1402-1544	4.5	89
Elland Old Hall, Yorkshire (Hillam 1983)	1372-1574	4.4	93
Ripon, Yorkshire (Boswijk 1998)	1408-1583	4.4	83

\* denotes single timber rather than a site chronology



**Table 5:** Dating of the oak sample SBY06

		<b>SBY06</b> <b>AD 1417 - 79</b>	
<b>Dated reference or site master chronology</b>	<b>Dates spanned (AD)</b>	<b><i>t</i>-value</b>	<b>Overlap (yrs)</b>
Welsh Borders (Siebenlist-Kerner 1978)	1341-1636	6.9	63
Salop95 (Miles pers comm)	881-1745	6.7	63
Wales97 (Miles pers comm)	404-1981	6.3	63
Ightfield, Shropshire (Groves 1997)	1341-1566	6.7	63
Bayton, Worcestershire (Bridge 1996)	1348-1525	6.6	63
Alcaston, Shropshire (Miles and Worthington 1998)	1389-1556	6.5	63
Bromfield, Shropshire (Nayling 2000b)	1389-1588	6.0	63
Abcott Manor, Clungunford, Shropshire (Miles pers comm)	1422-1545	5.7	63
Meeson2, Shropshire (Miles and Worthington 2000)	1408-1502	5.6	63
Stayley, Greater Manchester (Leggett 1980)	1365-1554	5.4	63
Hurstwood, Lancashire (Nayling 1998)	1402-1544	5.1	63

**Table 6:** Dating of the oak site chronology STUBLEY

		<b>STUBLEY</b> <b>AD 1382 - 1490</b>	
<b>Dated reference or site master chronology</b>	<b>Dates spanned (AD)</b>	<b><i>t</i>-value</b>	<b>Overlap (yrs)</b>
British Isles (Pilcher and Baillie pers comm)	404-1981	6.8	109
Salop95 (Miles pers comm)	881-1745	6.6	109
Welsh Borders (Siebenlist-Kerner 1978)	1341-1636	6.2	109
Wales97 (Miles pers comm)	404-1981	6.1	109
East Midlands (Laxton and Litton 1988)	882-1981	5.1	109
Stayley, Greater Manchester (Leggett 1980)	1365-1554	7.2	109
Sawley, Lancashire (Tyers 2000)	1433-1506	6.7	58
Bayton, Worcestershire (Bridge 1996)	1348-1525	6.6	109
Lathom5, Lancashire (Nayling 2000a)	1369-1465	6.6	109
Plowden2, Shropshire (Miles and Haddon-Reece 1993)	1330-1453	6.3	72
Bromfield, Shropshire (Nayling 2000b)	1389-1588	6.2	102
Elland Old Hall, Yorkshire (Hillam 1983)	1372-1574	6.2	109
Old Worden, Lancashire (Bridge 2003b)	1415-1531	6.1	76
Hurstwood, Lancashire (Nayling 1998)	1402-1544	5.7	89
Ightfield, Shropshire (Groves 1997)	1341-1566	5.6	109
Apethorn, Lancashire (Tyers 1999)	1379-1512	5.5	109

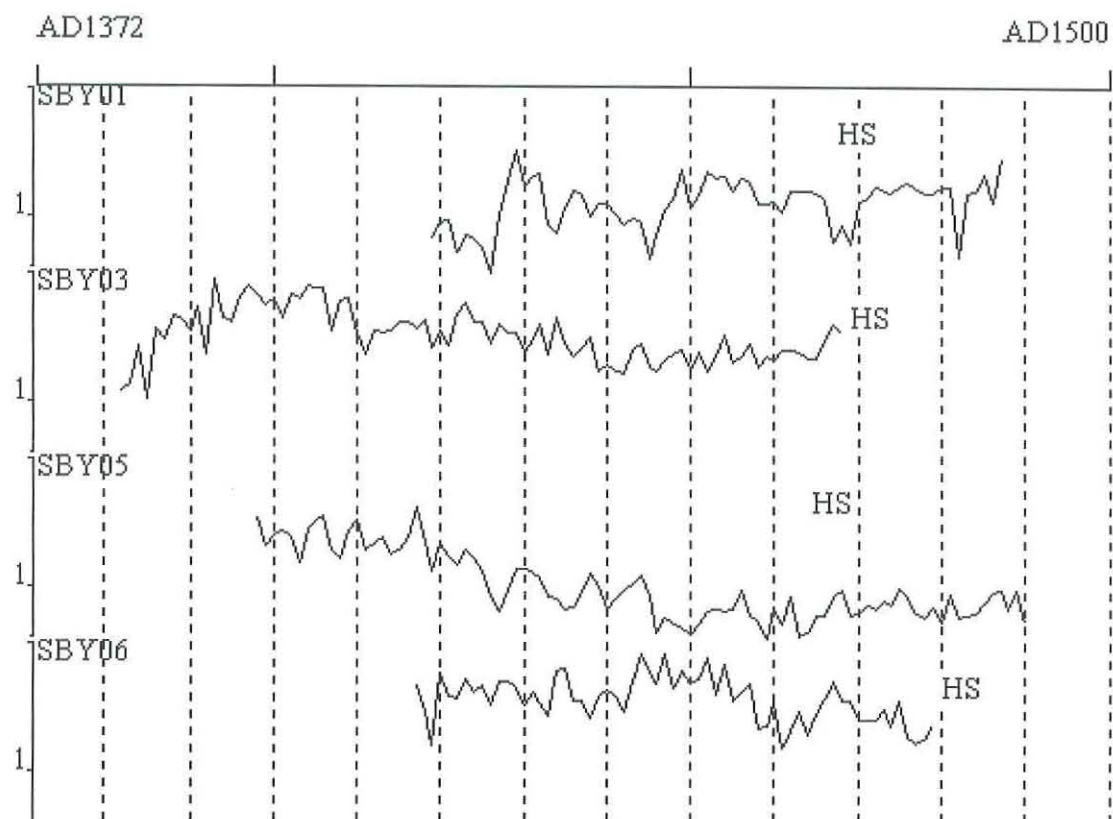
## **Interpretation and Discussion**

The few timbers available, and the fissured nature of the wood in the main beams of the ceiling to the ground-floor north-west room meant that it was not possible to derive a date for the felling of these timbers.

No acceptable statistical matches were found between the four individually dated timbers, although visual plots did show areas of agreement (Fig 5). Only a single series, that from the south purlin, had definite complete sapwood and was felled in spring or summer of AD 1491. The east windbrace on the north side of the cruck appeared to have complete sapwood, and if taken as complete, this timber was felled in AD 1487. This is of interest, since the windbraces looked to be later additions, though there is no evidence for this, but this date implies that they were either original, or used timber from approximately the same period of felling. The ridge piece and northern cruck blade retain the heartwood-sapwood boundary and give derived felling dates consistent with the late-fifteenth century dates above. This date is in line with the date for the cruck on stylistic grounds.

The lack of crossmatching between the samples is of interest, and, along with the different felling dates, perhaps implies different sources for the material, or unusual circumstances within a site leading to slightly different growth responses amongst a group of trees. There was sufficient visual agreement between the samples to suggest they be combined into a single site chronology, and strong consistent matches are found with this chronology and a range of reference chronologies, mostly of local regional origin.





**Figure 5:** Plots of the four dated series. The y-axis is the ring-width in mm and is a logarithmic scale

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**Table 7:** Ring width data for the site chronology STUBLEY covering the period AD 1382-1490

ring widths (0.01mm)										no of trees									
112	122	198	103	242	212	286	272	239	321	1	1	1	1	1	1	1	1	1	1
177	451	276	267	367	413	301	245	271	237	1	1	1	1	1	1	2	2	2	2
275	242	306	314	317	197	244	273	229	166	2	2	2	2	2	2	2	2	2	2
203	206	193	208	223	265	216	131	207	172	2	2	2	2	2	3	3	4	4	4
181	218	186	184	140	182	196	215	168	189	4	4	4	4	4	4	4	4	4	4
192	138	197	184	156	162	157	152	154	144	4	4	4	4	4	4	4	4	4	4
132	171	208	159	143	189	158	193	150	171	4	4	4	4	4	4	4	4	4	4
197	167	210	152	172	179	126	129	147	122	4	4	4	4	4	4	4	4	4	4
144	144	128	142	162	179	162	125	124	131	4	4	4	4	4	4	4	3	3	3
134	144	128	157	130	117	116	128	104	116	3	3	3	3	3	3	3	3	2	2
63	101	103	125	105	150	75	94	63		2	2	2	2	2	2	1	1	1	