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Dr Martin Bridge[1] and Richard Bond[2]

Summary

Several ranges at this site were the subject of a previous dendrochronological study. The dating of two of the ranges at the site remained unclear at the end of that study. Recent renovation and repair work allowed access to the wallplates of Range 3 (Sale Room) and further sampling was undertaken in Range 4 (Crossway). The dendrochronological evidence now indicates a felling date range of AD 1531-49 for various elements from Range 4. The only dated structural timbers from Range 3 are wallplates which were probably felled in AD 1540 or shortly afterwards. A detailed examination of the structural evidence strongly supports the hypothesis that the crown-post roof of the Sale Room is older than the Crossway structure. This implies that the Crossway was probably built from timber felled after AD 1531 and before about AD 1540, and that the crown post roof of the Sale Room was probably reassembled around AD 1540 using new wallplates.

Keywords

Dendrochronology
Standing Building

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Introduction

The Isaac Lord complex (NGR TM 168 441; Fig 1) has already seen a limited programme of dendrochronology (Bridge 1999). This previous study indicated that the earliest surviving phase of the site is Range 1, 80 Fore Street, dating from the first half of the fifteenth century, though this is based on the evidence of a single timber. Range 2, the Merchant's House, which dominates the site was constructed from timbers felled in spring AD 1636. Range 3, known as the Sale Room, could not be dated from the accessible timbers at the time of this previous study, but was known to predate the house which truncates it, and was suspected of post-dating Range 4, the crossway, which itself gave dates suggesting a likely mid sixteenth-century date for the felling of its timbers. One timber from the crossway was felled in AD 1587, though this was suspected of being a later, inserted timber.

Work continues on repairing and renovating the site, and the roof and wallplates of the Sale Room (Range 3) were made accessible. A further study of this range and the east end of Range 4 was requested in order to help further elucidate the history of this complex of buildings and inform a possible listing upgrade.

The roof of the sale Room is of crown-post construction and divided into four bays. The crown posts of the three intermediate roof trusses are plain and square in section. Each crown post is braced on both sides to the crown plate. The crown plate is made up of three equal length timbers, bridle-jointed together over the tops of the crown posts. The northern and southern crown posts are braced downwards to their respective tie beams on their eastern side only. The central crown post is not braced to its tie beam at all. An interesting feature of the roof structure is the use of double collars, the top collar being some 2'6" (780mm) above the lower.

Methodology

The site was visited in December AD 2001. The newly accessible timbers were assessed for their potential use in dendrochronological study. 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. Sometimes cores have less than 50 rings when extracted; those with over 40 rings are analysed.

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 (1999).

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

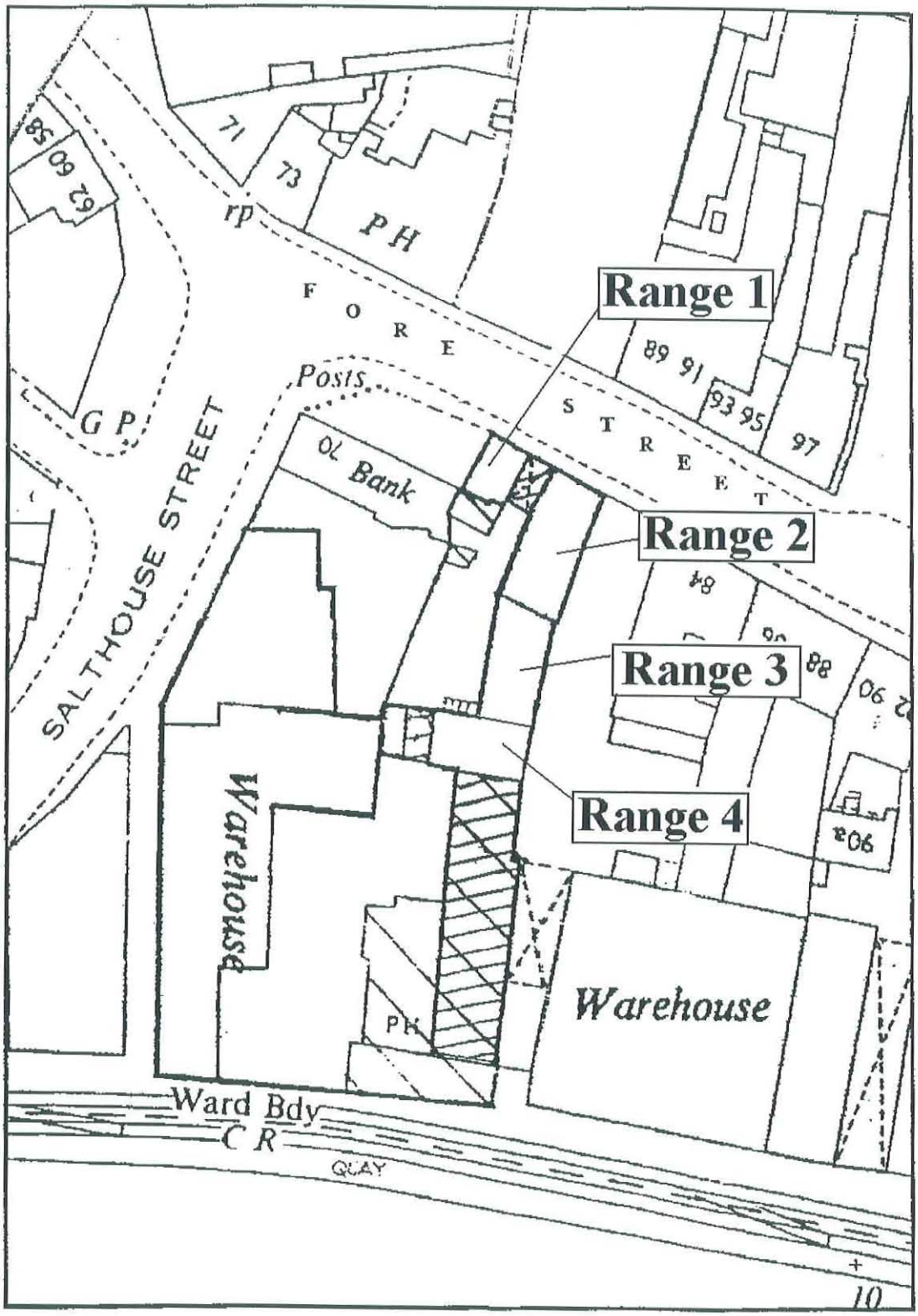

Figure 1: Location of the Isaac Lord complex within Ipswich, Suffolk, showing the positions of the ranges mentioned in the text

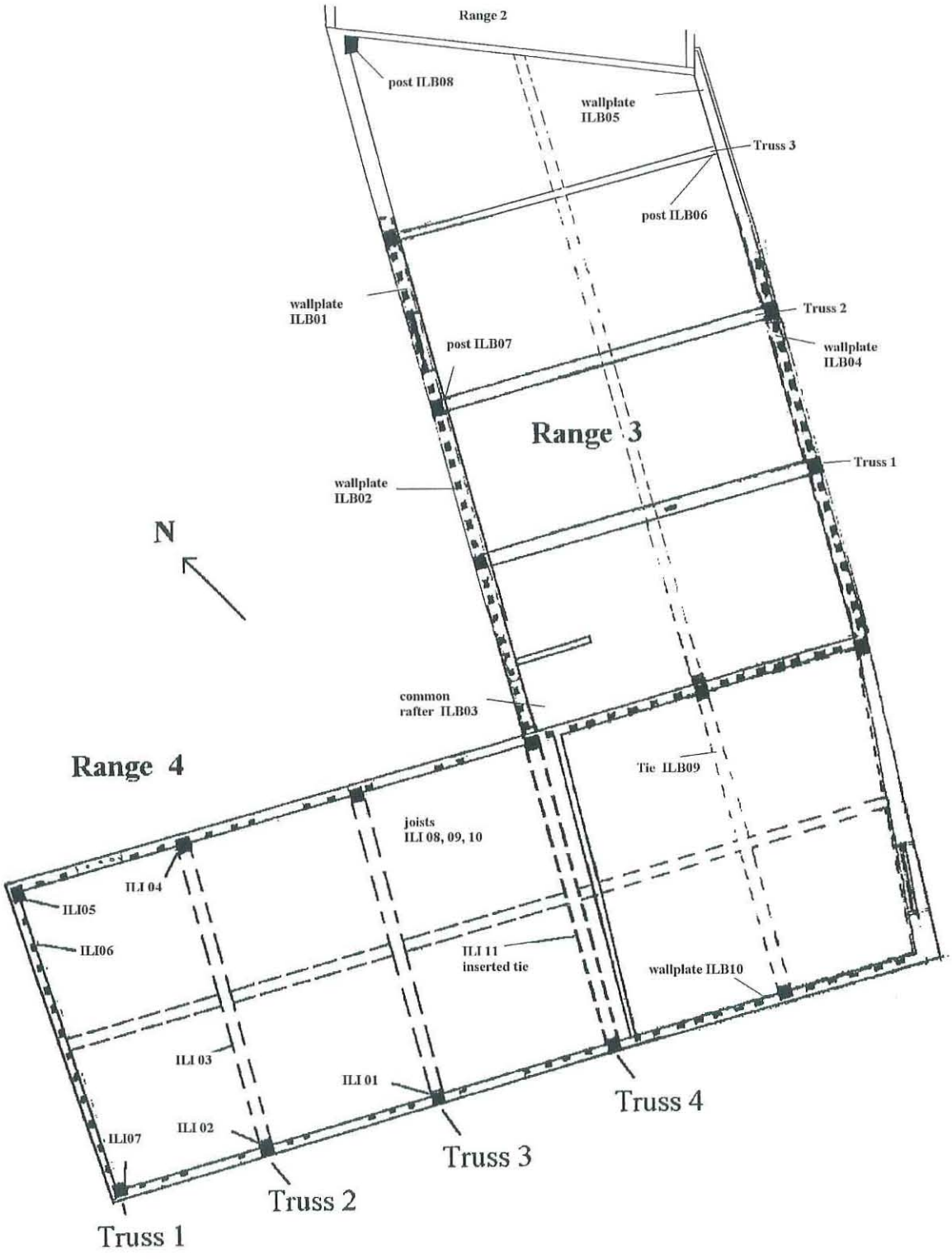

Figure 2: Plan of ranges 3 and 4 showing the locations of samples taken in this study (ILB) and those from the previous work (ILI)

Table 1: Oak (*Quercus* spp.) timbers sampled from ranges 3 and 4 of the Isaac Lord complex, Ipswich. 1/2C means that part of the following year's ring was present before the bark

Sample number	Origin of core	Total no of years	Average growth rate (mm yr^{-1})	Date of last heartwood ring AD	Sapwood details	Date of sequence AD	Felling date of timber AD
Range 3 (Sale Room)							
ILB01	West wallplate, north end	68	1.89	1525?	h/s?	1458 - 1525	1534 – 66?
ILB02	West wallplate, south end	77	1.51	1530	10 complete?	1464 - 1540	1540?
ILB03	Common rafter 3, bay 1 west	<40	unmeasured	-	-	undated	unknown
ILB04	East wallplate, south end	49	2.09	1500	20	1472 - 1520	1520 – 41
ILB05	East wallplate, north end	55	1.76	1527	2	1475 - 1529	1538 – 68
ILB06	Post 1 west	90	2.02	-	12	undated	unknown
ILB07	Post 2 west	49	1.58	-	14+1/2C	undated	unknown
ILB08	North west corner post	51	1.92	-	h/s	undated	unknown
Range 4 (Crossway)							
ILB09	Tie at east end	86	2.37	-	11	undated	unknown
ILB10	South wallplate	57	1.30	1508	5	1457 - 1513	1517 - 49

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 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).

One of us (RB) undertook an extensive examination of the exposed roof of the Sale Room (Range 3) which provided information presented in the Discussion.

Results

All the timbers sampled were of oak (*Quercus* spp.). Details of the timbers and their locations are given in Table 1, the approximate positions of the samples being shown in Figure 2. Four samples from the Sale Room (Range 3) were found to crossmatch with each other (Table 2), and these series were combined to form a new site master chronology ISAAC RANGE3, which was subsequently dated against a range of regional and site chronologies (Table 3) to the period AD 1458 – 1540.

Table 2: Crossmatching between dated elements in Range 3

	t value		
Sample no	ILB02	ILB04	ILB05
ILB01	8.4	7.3	9.8
ILB02		5.2	6.5
ILB04			6.6

The other individual samples from Range 3 did not give consistent crossmatches with the available reference material, and therefore remain undated.

A single sample from Range 4 (Crossway), ILB10, matched against the existing chronology (Bridge 1999) from this building and gave consistent matches in the same position against reference material (Table 4), dating the sequence to AD 1457 – 1513.

The ring-width data for ISAAC RANGE3 and ILB10 are given in Table 5. Figure 3 is a bar diagram showing all the dated timbers from this site, ie those from the first investigation (Bridge 1999) and this study,

Table 3: Dating of the oak site chronology ISAAC RANGE3

	ISAAC RANGE 3 AD 1458 - 1540	
Dated reference or site master chronology	*t*-value	Overlap (yrs)
FEB2000 (Bridge 2000)	5.8	83
Oxon93 (Miles pers comm)	4.7	83
Magdalen Laver, Essex (Tyers and Boswijk 1998)	6.6	77
Broomfield, Enfield, London (Bridge 1997)	6.1	83
Bruce Castle, Tottenham, London (Bridge 1998a)	5.9	83
Little Wymondley, Hertfordshire (Bridge 2001a)	5.6	83
Otley Hall, Suffolk (Bridge 2001b)	5.1	83
Gosfield, Essex (Bridge 1998b)	4.9	80
Wimpole, Cambridgeshire (Bridge 1998c)	4.6	72
Isaac Lord (Bridge 1999)	2.0	83

Table 4: Dating of the oak sample ILB10

	ILB10 AD 1457 - 1513	
Dated reference or site master chronology	*t*-value	Overlap (yrs)
Southern England (Bridge 1988)	6.0	57
Kent (Laxton and Litton 1989)	5.1	57
Martin Tower, Tower of London (Bridge 1983)	5.6	57
Gosfield, Essex (Bridge 1998b)	4.7	57
Fawsley, Northamptonshire (Howard *et al* 1999)	4.6	57
Widdington, Essex (Tyers 2001)	4.4	57
Isaac Lord ILICROSS (Bridge 1999)	4.1	57

Table 5: Ring width data for the site chronology ISAAC RANGE3 and sample ILB10

ring widths (0.01mm)	**no of trees**
ISAAC RANGE3 AD 1458 – 1540	
154 151 183 132 122 116 71 133 127 148	1 1 1 1 1 1 2 2 2 2
250 247 190 144 305 197 264 202 180 177	2 2 2 2 3 3 3 4 4 4
168 264 316 301 207 178 199 259 196 264	4 4 4 4 4 4 4 4 4 4
240 254 267 226 180 181 170 150 208 176	4 4 4 4 4 4 4 4 4 4
156 234 205 136 144 129 136 146 162 123	4 4 4 4 4 4 4 4 4 4
144 144 119 102 121 117 104 132 139 97	4 4 4 4 4 4 4 4 4 4
118 157 150 122 184 170 177 166 163 171	4 4 4 3 3 3 3 3 2 2
148 175 209 250 147 123 126 241 198 154	2 2 1 1 1 1 1 1 1 1
168 211 218	1 1 1
ILB10 AD 1457 - 1513	
137 181 104 107 188 132 146 121 134 112	
98 153 115 161 180 142 140 118 152 126	
89 95 95 160 222 177 138 119 123 136	
156 153 120 138 79 103 115 135 160 197	
162 111 130 97 119 119 117 128 109 192	
101	

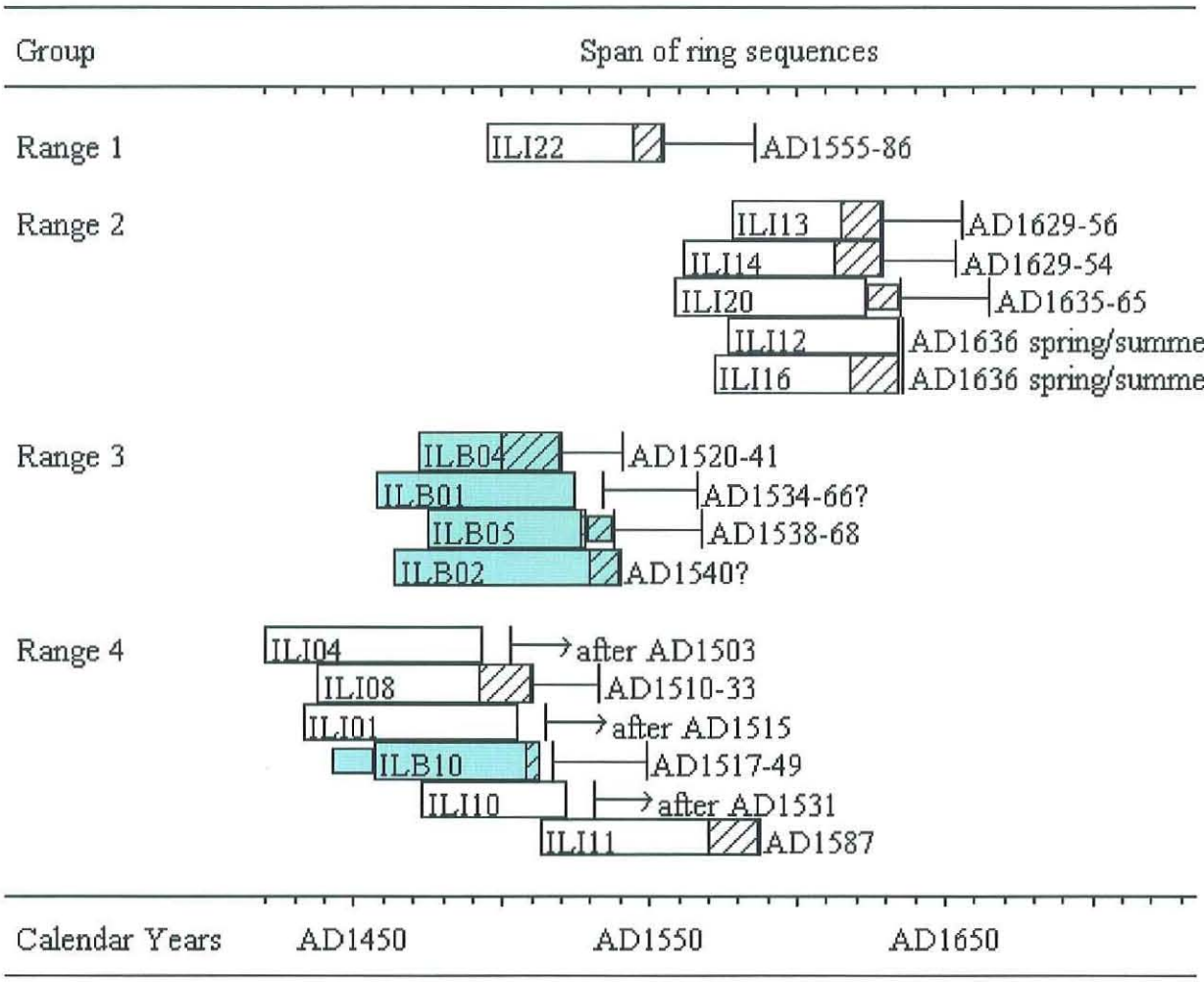

Figure 3: Bar diagram showing the relative positions of overlap of all dated timbers from the Isaac Lord complex. Those dated in this study are shaded in blue. Hatched portions of bars represent sapwood and narrow sections represent additional unmeasured rings

Discussion

All the dated timbers from the Sale Room (Range 3) were wallplates which were not accessible in the previous study. The bark edge was noted on timber ILB02 at the time of sampling, but slight fragmentation during coring meant that it was not certain that this edge was retained on the core. The felling date for this timber should therefore be taken as AD 1540 or within a very few years thereafter. The other felling dates derived from the wallplates appear compatible with this date. Several of the other timbers sampled in this range, the posts and rafters, looked as if they may be re-used timbers. There is clear evidence of this in the case of ILB06, the north east corner post, the mortice for the existing tie beam brace has been re-cut and re-pegged, and there is the remnant of a lower mortice that has been filled with mortar as if to disguise it.

Although the new site chronology gave strong consistent matches against several chronologies, it did not give a significant match against the existing Isaac Lord chronologies (Table 3), suggesting that these timbers came from a different source to those used elsewhere on the site.

The single additional dated sample from the east end of Range 4 (Crossway) did match well with the other timbers from this range and does give valuable additional information because of it having five sapwood rings. Whilst one must necessarily employ caution in dating a phase on the basis of a single timber with sapwood, the similarity in date span with the dated timbers from the previous study (Bridge 1999) suggests that a felling date range of AD 1531-49 may be hypothesised for this group (timber ILI10 from the previous study being felled after AD 1531).

From the dendrochronological evidence alone therefore it might seem reasonable to propose that the Crossway and the Sale Room are very similar in age, but which came first, or whether they were exactly contemporaneous, could not be determined.

However, structural analysis of the timbers strongly suggests that the crown-post roof of the Sale Room, which bears similarity with the earliest phase of the house to the front of the property (early to mid fifteenth-century, Bridge 1999), has at some time been taken down and then re-erected. The evidence for this includes the crown-posts having been shortened, necessitating the addition of another level of collars. The upper collars appear to match the rafters, these having two sets of scribed assembly marks – one set almost on top of the other. One of these upper collars has a mark where it once sat on the crown plate. The braces to the collar-purlin are almost identical to those in number 80 Fore Street. The wall posts appear to be re-used. The lack of windows and overall plan of the Crossway strongly suggest that it was planned to have its east end built up against, hence Range 3 either already existed or was planned at the same time.

It appears from the above evidence that Range 4, the Crossway, was constructed from timbers felled in the period AD 1531-49 and possibly (see below) AD 1531-*c*40, though it must be stressed that only two primary timbers from Range 4 had sapwood. The crown-post roof of Range 3, the Sale Room, seems to have been dismantled prior to the construction of Range 4 and then reassembled, incorporating new wallplates felled in AD 1540 or very soon thereafter, shortly after the erection of Range 4. These Ranges clearly pre-date the Merchant's House (Range 2) for which dendrochronological evidence indicates a construction date shortly after felling in AD 1636 (Bridge 1999). The earliest felling phase identified during the dendrochronological study is in the first

half of the fifteenth century, though this is based on the dating of a single post from Range 1.

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