

Tree-Ring Analysis of Timbers from Elland Old Hall, West  
Yorkshire

by Jennifer Hillam (Jan 1984)

Twenty nine timbers from Elland Old Hall (SE 105 215) were examined at the DoE Dendrochronology Laboratory in 1983 (Table 1). Apart from one conifer floorboard, all the timbers were oak (Quercus). Seven samples were rejected for dating purposes, as they had less than 50 annual rings. The remainder had between 55 and 191 rings. Only one sample (15) had any sapwood.

The timbers were from different parts of the building, and it was hoped that, as well as providing accurate dates for the different phases of construction, their ring sequences would produce a continuous tree-ring chronology from the 12th to 18th centuries.

The ring widths were measured with a X10 hand lens, fitted with a 0.1mm graticule, since the samples were too large to be measured under a microscope. The lens is accurate enough for tree-ring analysis, but it is time-consuming and tiring to use. The operation was made more efficient, however, by punching the widths into a microcomputer as they were measured.

The ring widths were plotted as graphs, or tree-ring curves, which were then compared with each other. All but one of the floorboard sequences crossmatched. The exception was 5.21 which had only 55 rings. Some of the curves were almost identical, and represent timbers which come from the same tree: 5.5 and 5.24; 5.1, 5.13, 5.22 and 5.28. The

floorboard sequences also crossdated with those from the 16th century Hall (Fig 1).

The Elland sequences were then compared with the following dated reference chronologies: Yorkshire (Hillam, unpubl.), 'Wales' (Siebenlist-Kerner, 1978) and Bishops' House (Morgan, 1977). Significant, and sometimes surprising, results were found for many of the timbers (Table 2). All but five sequences (1, 4, 5.21, 16, 18) crossdated; the undated timbers were those with less than 65 rings. A master chronology (Table 3) was constructed from the matching tree-ring sequences. (Sequences from the same tree were first meaned to avoid biasing the master curve.) The Elland master was very similar to other English reference chronologies. Yorkshire, 'Wales' and Bishops' House gave  $t$ -values of 8.9, 9.4 and 6.8 respectively. The Elland master covers the period AD 1374-1574.

#### The Early Hall

This is thought to be constructed in c.1290, but tree-ring dating was unable to improve on this as none of the four timbers were datable.

#### Floorboards

The date of these was unknown prior to the tree-ring analysis. The dates of the outer rings of the three groups, each from one tree, are 1539, 1526 and 1512 (Fig 1). The trees must have been felled therefore some time after 1562, 1549 and 1535 respectively. Absence of sapwood makes it impossible to calculate the felling dates more accurately than this. The three groups of floorboards could have been added at the same time.

### The 16th century Hall

All the timbers from this group have been dated (Fig 1), but again absence of sapwood made the interpretation of the results difficult. The tree-ring dates are set out in Table 2: timbers 7 and 10 (a wall plate and tie beam) appear earlier in date than the others but this may be because more heartwood has been removed from these during conversion. Timber 7, in particular, had very narrow rings at the outside so that the removal of 10-50mm of heartwood could easily account for the loss of 50-60 rings in the ring record (compare floorboards 5.5 and 5.24 from the same tree).

The felling date of most of the timbers is after AD 1530, possibly 1530-40. Timbers 7 and 10 could have been felled any time after 1478, but were probably contemporary with the other wall plates and tie beams. The Queen-strut (13) appears to have been felled slightly later: some time after 1555.

### The Hall Outshot

The aisle principal from the Outshot was felled about 1606 $\pm$ 9. The outer ring was very close to the sapwood so that a more accurate felling date can be estimated.

### The 18th century re-roofing

The principal rafter (16) had 58 rings which have not yet been dated.

### The 14th century Solar

This is thought to be constructed in c.1300. It was therefore surprising when timber 17 dated to 1395-1479. The timber cannot have been felled before AD 1502, and may be a later addition. (The number of sapwood rings is taken as 32 $\pm$ 9 - see Baillie, 1982.)

### Conclusion

Tree-ring analysis has provided dates for several phases of the Hall's construction, although absence of sapwood has hampered the interpretation of the tree-ring dates. The Elland tree-ring chronology covers the period AD 1374-1574. The 14th and 17th century timbers had few rings so that it was not possible to produce a longer chronology.

### Acknowledgements

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### References

- Baillie MGL 1982 Tree-Ring Dating and Archaeology, London, Croom Helm.
- Morgan RA 1977 Dendrochronological dating of a Yorkshire timber building, Vernacular Architecture 8, 809-14.
- Siebenlist-Kerner V <sup>1978</sup> The chronology, 1341-1636, for certain hillside oaks from western England and Wales. In JM Fletcher (ed), Dendrochronology in Europe BAR S51, 157-61.

Fig 1: Elland Old Hall bar diagram showing the years spanned by each dated ring sequence. H/S - heartwood-sapwood transition.

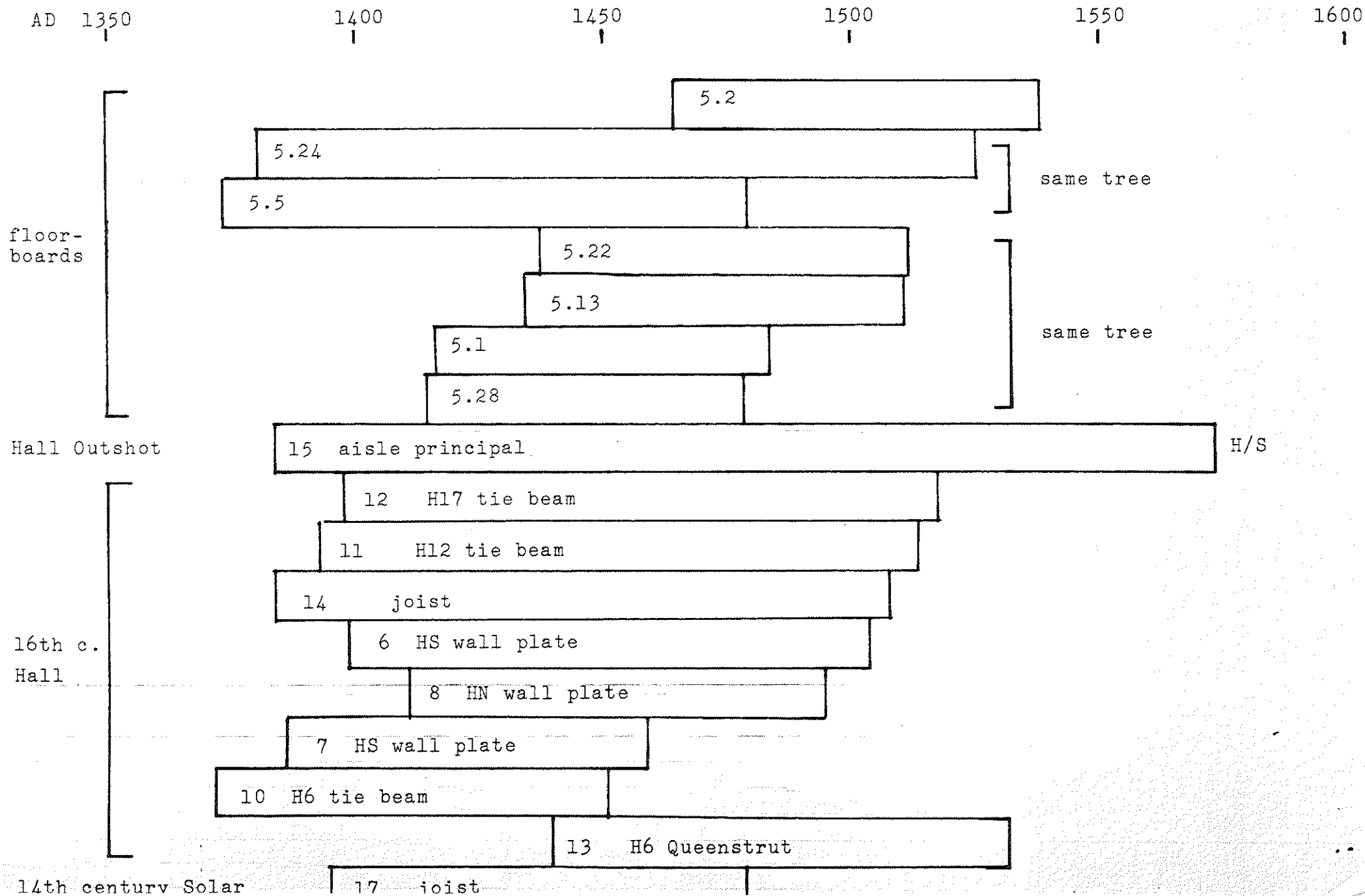

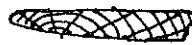









Table 1: Details of the measured samples. Sketches are not to scale. None of the samples, except 15, had sapwood.

sample no	function	total no of rings	sketch	maximum dimensions (mm)
<u>Early Hall</u>				
1	post H12 south	61		470 x 200
4	post H17 north	55	not available	
<u>Floorboards C3/4 - all one room</u>				
5.1		68		330 x 25
5.2		75		310 x 20
5.5		107		310 x 20
5.13		77		305 x 20
5.21		55		270 x 35
5.22		75		310 x 20
5.24		146		280 x 20
5.28		65		260 x 20
5.34	conifer - not measured			
5.3, 5.4, 5.25, 5.29	insufficient rings - not measured			

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Elland Old Hall/dendro

Table 1/cont



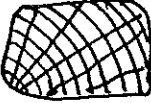

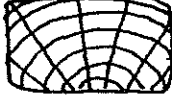



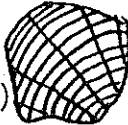

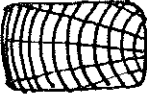

sample no	function	total no of rings	sketch	maximum dimensions (mm)
<u>16th century Hall</u>				
6	HS wallplate	106		260 x 210
7	HS wallplate	74		270 x 210
8	HN wallplate	85		250 x 200
10	H6 tie beam	80		360 x 190
11	H12 tie beam	122		340 x 170
12	H17 tie beam	121		230 x 185
13	H6 Queenstrut	93		240 x 60
14	Hall joist	125		350 x 300
<u>Hall Outshot</u>				
15	Aisle principal	191 (close to sapwood)		320 x 270
<u>18th century re-roofing</u>				
16	Principal rafter C4	58		270 x 80
<u>14th century solar</u>				
17	Joist E C1, west	85		170 x 120
18	" , 2nd from west	55		175 x 165

Table 2: Summary of tree-ring dates

sample no	date span of ring sequence	estimated felling date
5.1	1417-1484	after 1535
5.2	1465-1539	after 1562
5.5	1374-1480	after 1549
5.13	1435-1511	after 1562
5.22	1438-1512	after 1535
5.24	1381-1526	after 1549
5.28	1415-1479	after 1535
6	1399-1504	after 1530
7	1386-1459	after 1478
8	1411-1495	after 1530
10	1372-1451	after 1478
11	1393-1514	after 1530
12	1398-1518	after 1530
13	1440-1532	after 1555
14	1384-1508	after 1530
15	1384-1574	c.1606 $\pm$ 9
17	1395-1479	after 1502



Table 3: Elland Old Hall master chronology, AD 1374-1574

year	ring widths(0.1mm)										no of sequences per decade
	0	1	2	3	4	5	6	7	8	9	
1374					37	20	36	32	40	32	1
1380	20	22	29	30	30	21	34	32	32	22	3
1390	22	23	23	22	23	26	28	22	24	24	4
1400	34	30	28	26	24	21	26	18	19	23	7
1410	22	23	26	23	17	21	17	22	23	16	8
1420	32	24	19	28	21	22	21	19	21	24	9
1430	25	26	29	20	24	29	27	24	23	19	9
1440	25	22	18	25	26	23	16	18	17	17	10
1450	15	21	20	18	19	19	22	21	19	16	10
1460	21	19	22	21	17	17	19	25	23	23	10
1470	26	20	16	20	22	31	27	24	21	26	11
1480	20	19	16	26	26	25	24	29	18	20	10
1490	18	12	13	15	18	18	25	19	17	16	10
1500	14	14	14	15	16	19	19	15	16	19	9
1510	16	20	16	13	13	14	15	15	21	21	6
1520	16	22	21	16	19	14	16	17	24	21	4
1530	20	20	17	14	14	23	22	18	15	18	2
1540	14	10	9	11	11	13	8	7	11	10	1
1550	9	10	9	10	9	11	10	9	9	9	1
1560	9	10	10	11	10	12	13	10	8	8	1
1570	9	10	12	9	10						