Centre for Archaeology Report 77/2002

Tree-Ring Analysis of Timbers from Grange Farm Barn, Grove Road, Ingham, Near North Walsham, Norfolk

Dr Martin Bridge

ISSN 1473-9224

Centre for Archaeology Report 77/2002

Tree-Ring Analysis of Timbers from Grange Farm Barn, Grove Road, Ingham, Near North Walsham, Norfolk

Dr Martin Bridge

Summary

This single-aisled barn has undergone many changes during its long life. The present roof, thought to date from c AD 1700 was found to be of softwood construction and was not investigated further. Six aisle posts are present, of which one is a softwood replacement. The remaining aisle posts were suspected of being of different ages, although three show slots for passing braces, suggesting an early origin. This study showed that three central aisle posts all date to the late-fourteenth century. They appear to form a single group most likely felled in the period AD 1380-1.

Stylistic similarities between this barn and structures in Snape, Suffolk, and Thetford, Norfolk are of interest. Whilst the Thetford cottage appears to be between twenty-four and forty-five years younger, the barn at Snape remains undated by dendrochronology.

Keywords

Dendrochronology
Standing Building

Author's address
Institute of Archaeology, University College London, 31-34 Gordon Square, London, WC1H 0PY
Tel: 020 7679 1540. Email: martin.bridge@ucl.ac.uk

Introduction

Grange Farm Barn, Ingham (NGR TG 3848 2605; Fig 1) is a grade II* listed single-aisled barn of flint walls with brick dressings. It has seven bays and stylistically shows many parallels with the cottage at Abbey Farm, Thetford, Norfolk, dendrochronologically dated to AD 1405-30 (Howard *et al* 2000; Groves 2002), and the undated barn at Abbey Farm, Snape, Suffolk (Bridge 1999a). On the west side the ties are arch-braced to the wall posts. It is the arcade posts and their associated plates which are of most interest to this study (Figs 2 and 3).

The northern-most of the six arcade posts, post 1 (Fig 2), is softwood and thought to have been inserted at the time of construction of the present roof, also made of softwood timbers. The second arcade post from the north end has a very shallow jowl (or 'upstand'), a slot for a passing brace, and it rakes back into the aisle at its foot. There is a small upright at the foot which may be primary to the construction. Along with its corresponding arcade plate, this post is thought to be fifteenth century in origin. The third and fourth arcade posts and plates are thought to be sixteenth century, and these too have slots for passing braces. The third post is also raked back into the aisle, and has a jowl which, unusually, projects into the aisle, perhaps to address an earlier cart porch. The remaining posts, although of oak, are thought to be contemporaneous with the present roof structure. It has been suggested that the name 'Grange Farm' implies an origin possibly associated with the Ingham Trinitarian community founded in AD 1360.

This study was requested by English Heritage to elucidate the chronological development of the site and provide a dated parallel for architectural features found at Thetford and Snape to refine typological dating evidence.

Methodology

The site was visited in December AD 2001. The 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.

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 *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).

Results

The roof structure above tie-beam level, ie the principal rafters, common rafters and collars were identified as being of softwood and were regarded by Stephen Heywood (Norfolk County Council) as not being important to the dating questions at this site, so despite being part of the original brief, the decision was made not to sample this phase. Stylistically the roof is thought to date to *c* AD 1700.

All the timbers sampled were of oak (*Quercus* spp.). The locations of samples and basic details about them are given in Table 1 and illustrated in Figure 2. The arcade plate associated with Post 2 was not sampled as it was judged to have too few rings. Other bits of arcade plate associated with Posts 4 and 5 were sampled, but no illustration of this arcade plate was available on which to locate these samples, so their approximate location is shown in Figure 2.

Timbers GFI04 and GFI05 matched each other with $t = 5.3$ (56 years of overlap) but neither the individual samples, nor a combined series GFI0405m gave consistent matches with the reference chronologies. GFI05 showed an abrupt growth decline in its outer years, as did other samples from this assemblage.

Three of the samples crossmatched (Table 2; Figure 4). These timbers were derived from longer-lived trees than most of the rest of the assemblage, and have relatively consistent growth patterns. They were combined into a site chronology, INGHAM. This site master was dated against a range of regional and site chronologies, the best results being shown in Table 3. The data for this chronology are given in Table 4.

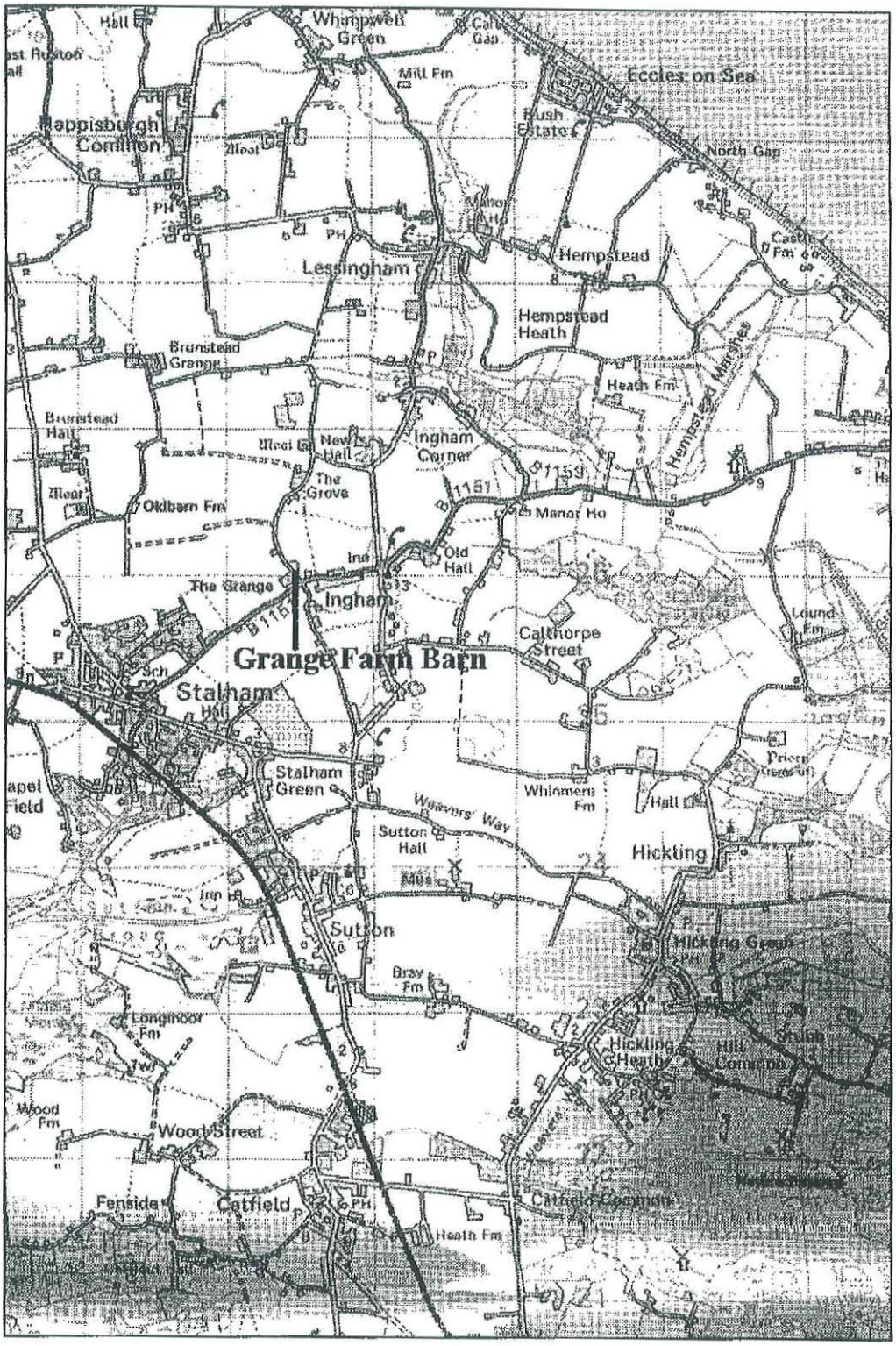

Figure 1: Map to show the general location of Grange Farm Barn, Ingham

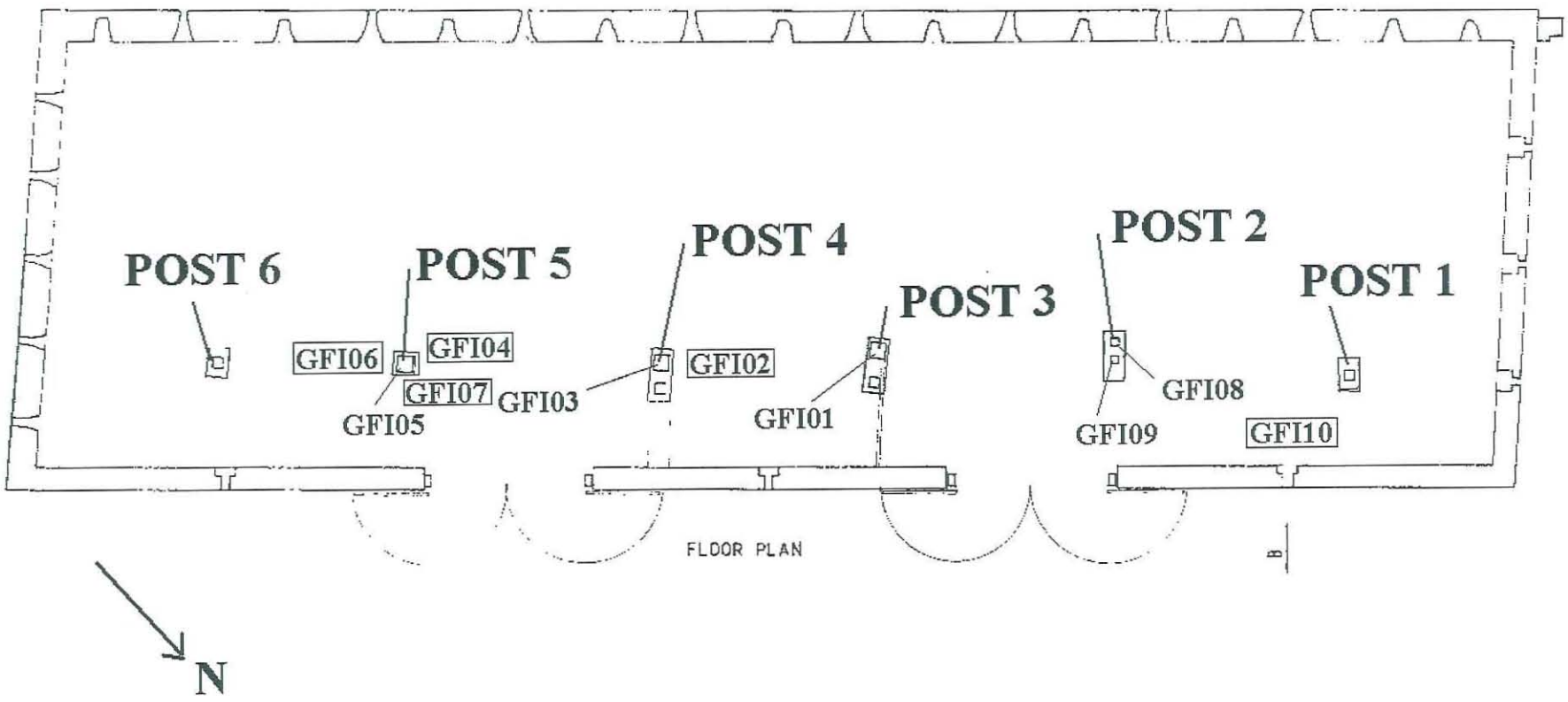

Figure 2: Floor plan of Grange Farm Barn, Ingham, showing the locations of the arcade posts investigated in this study, and the sample locations of cores taken. Sample names in boxes represent the approximate position of the timber sampled within the barn. Adapted from an original drawing by Rodney Palmer Ltd

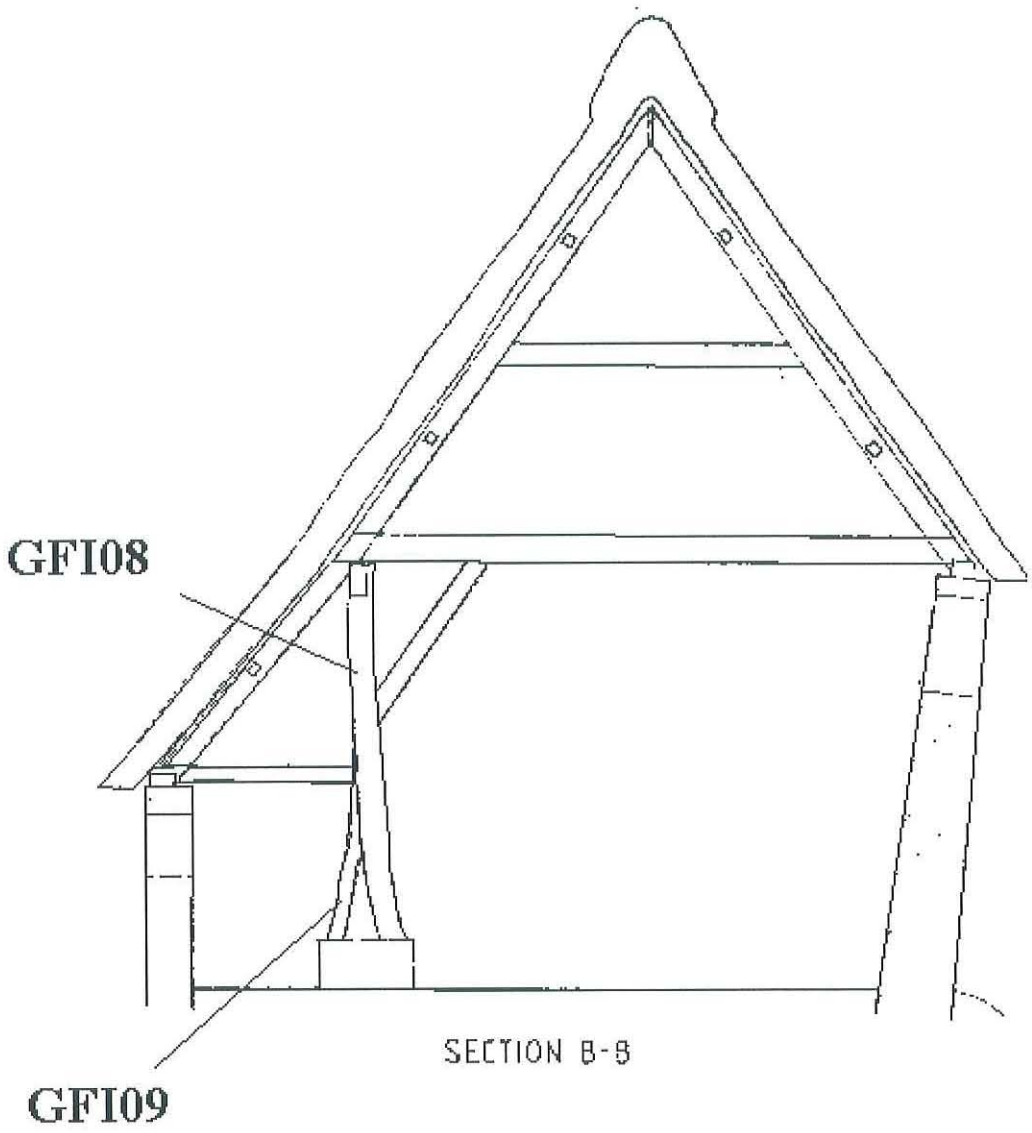

Figure 3: Section through Grange Farm Barn, Ingham, showing Post 2 and its associated timbers, adapted from an original drawing by Rodney Palmer Ltd

Table 1: Oak (*Quercus* spp.) timbers sampled from Grange Farm Barn, Ingham, Norfolk. + ½ C represents a partial ring after the last complete ring and before the bark, C indicates complete sapwood, numbers in brackets indicate additional unmeasured rings, and h/s represents the 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
GFI01	Post 3 (assembly mark IIII)	110	1.50	31(+3 or 4 C)	1268 - 1377	1380 - 1
GFI02	Arcade plate, west of post 4	75	1.70	20	undated	unknown
GFI03	Post 4	102	1.35	h/s	1243 - 1344	1353 – 85
GFI04	Arcade plate, west of post 5	56	2.73	15 (+4)	undated	unknown
GFI05	Post 5	63	2.46	29 + ½ C	undated	unknown
GFI06	Brace from post 5 to tie	<50	unmeasured	-	undated	unknown
GFI07	East brace from post 5 to arcade plate	<50	unmeasured	-	undated	unknown
GFI08	Post 2	83	1.20	-	1248 - 1330	after 1339
GFI09	Lower part of post 2	<50	unmeasured	-	undated	unknown
GFI10	Reused rafter bay 2 north	78	1.94	-	undated	unknown

	t - values	
Sample	**GFI03**	**GFI08**
GFI01	10.3	7.2
GFI03		8.1

Table 2: Level of crossmatching between the dated samples in INGHAM

Similarities in style between the posts in this barn and the barn at Abbey Farm, Snape, Suffolk which failed to date dendrochronologically (Bridge 1999a) suggested that they may be similar in date. A comparison of the eight-timber Snape site chronology with INGHAM gave a *t*-value of 5.2 with the outer ring at AD 1374. It gave $t = 4.0$ against the East Midlands Chronology (Laxton and Litton 1988) at the same position. Visual comparisons between these curves are reasonable, but despite extensive comparisons no further matches at this position were found, and that site remains undated.

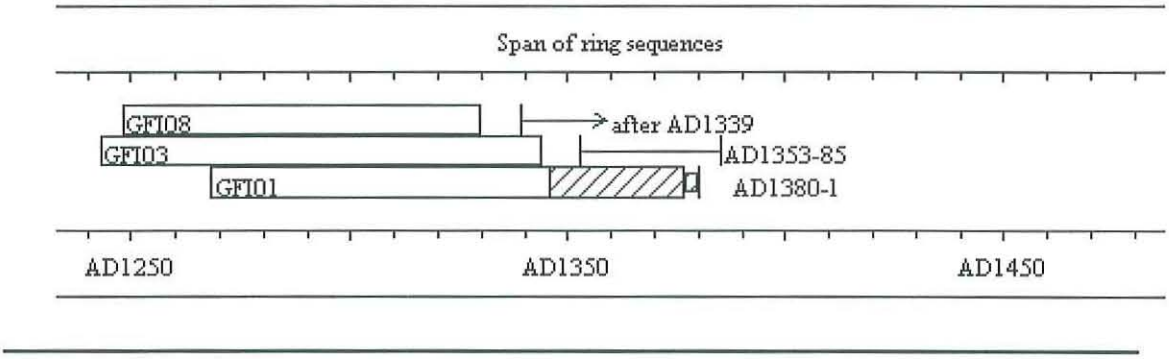

Figure 4: Bar chart showing the relative positions of overlap of the three dated timbers from Grange Farm Barn, Ingham, with the interpreted most likely felling date ranges. Sapwood is shown hatched, and a narrow bar indicates additional unmeasured rings

Discussion

Three of the posts sampled in this study all gave results indicating felling in the late-fourteenth century, much earlier than had previously been thought. Three of the timbers matched each other well and appear to form a group with a likely felling date range of AD 1380-1. This is twenty years after the foundation of the Trinitarian community and may mark a stage in its development. Sadly none of the arcade plates associated with these posts gave dates, so they cannot be conclusively tied with the posts dated here.

The architectural similarities between this site and Abbey Farm, Thetford are of interest, though there are a minimum of twenty-four years between the felling dates of the

timbers at these sites. It is likely therefore that the structures are at least a generation apart in building, showing the problems associated with stylistic dating alone.

The barn at Abbey Farm, Snape in Suffolk shows many similarities in form and is a third site with ecclesiastical connections. It may well be of similar age but it cannot be considered as dated at this stage, even though some statistical matches have been found which hint at a very similar date.

Acknowledgements

I would like to thank English Heritage for funding this research, in particular Dr Peter Marshall for his administrative work in connection with this project. The owner, Mr Sterry, allowed access and a neighbour generously loaned a ladder and provided hot tea. Stephen Heywood (Norfolk County Council) introduced me to the building and his interpretation of the likely development and important timbers to sample. Cathy Groves (University of Sheffield) reviewed an earlier draft of this report and made several valuable comments.

References

Arnold, A J, Laxton, R R, and Litton, C D, 2002 *Tree-ring analysis of timbers from Manor Farm Barn, Frindsbury, Kent,* Centre for Archaeol Rep, **42/2002**

Baillie, M G L, and Pilcher, J R, 1973 A simple cross-dating program for tree-ring research, *Tree Ring Bulletin,* **33**, 7-14

Bridge, M C, 1999a *Tree-ring analysis of timbers from Abbey Farm Barn, Snape, Suffolk,* Anc Mon Lab Rep, **51/1999**

Bridge, M C, 1999b *Tree-ring analysis of timbers from 15 High Street Great Dunmow, Essex,* Anc Mon Lab Rep, **21/99**

Bridge, M C, 2000a Compilation of all MCB-dated sites, *FEB2000* unpubl computer file, the author

Bridge, M C, 2000b *Tree-ring analysis of timbers from St Andrew's Church, Ford, West Sussex,* Anc Mon Lab Rep, **27/2000**

Bridge, M C, 2001 *Tree-ring analysis of timbers from the Church of St Mary Magdalene, Debenham, Suffolk*, Centre for Archaeol Rep, **43/2001**

Groves, C, 2002 *Tree-ring analysis of oak timbers from the Abbey Farm Barn and Cottage, Thetford, Norfolk - Revisited*, Centre for Archaeol Rep, **18/2002**

Groves, C and Hillam, J, 1993 *Tree-ring dating of oak timbers from Lodge Farm, Denton, Norfolk,* Anc Mon Lab Rep, **85/93**

Hollstein, E, 1965 Jahrringchronologische von Eichenholzern ohne Walkande, *Bonner Jahrb,* **165,** 12-27

Howard, R, Laxton, R R, Litton, C D, 1998 *Tree-ring analysis of timbers from St Andrew's Church, Owston, Leicestershire,* Anc Mon Lab Rep, **39/98**

Howard, R E, Laxton, R R, and Litton, C D, 2000 *Tree-ring analysis of timbers from the barn and cottage, Abbey Farm, Thetford, Norfolk,* Anc Mon Lab Rep, **48/2000**

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 Archaeological Studies, Monograph Series, **III**

Miles, D H, 1996 List 70 - Tree-ring dates, *Vernacular Architect*, **27**, 93-5

Miles, D, 1997 The interpretation, presentation, and use of tree-ring dates, *Vernacular Architect,* **28,** 40-56

Miles, D H, and Haddon-Reece, D, 1993 List 54 - Tree-ring dates, *Vernacular Architect*, **24**, 54-60

Munro, M A R, 1984 An improved algorithm for crossdating tree-ring series, *Tree Ring Bulletin,* **44**, 17-27

Salzman, L F, 1952 *Building in England down to 1540,* Oxford

Tyers, I, 1996 *Tree-ring analysis of the bellframe at the Church of St Mary Magdalene, Twyning, Gloucestershire,* Anc Mon Lab Rep **29/96**

Tyers, I, 1999 *Dendro for Windows Program Guide 2nd edn*, ARCUS Rep, **500**

Tyers, I, 2000 *Tree-ring analysis of oak timbers from the Prior's House, Castle Acre, Norfolk*, Anc Mon Lab Rep, **46/2000**

Table 3: Dating of the oak site chronology INGHAM

	INGHAM AD 1243 - 1377	
Dated reference or site master chronology	*t*-value	Overlap (yrs)
FEB2000 (Bridge 2000a)	5.4	135
East Midlands (Laxton and Litton 1988)	5.1	135
Oxon93 (Miles pers comm)	4.7	135
Frindsbury, Kent (Arnold *et al* 2002)	6.7	124
Denton, Norfolk (Groves and Hillam 1993)	6.2	135
Froxfield, Hampshire (Miles and Haddon-Reece 1993)	5.3	66
Twyning, Gloucestershire (Tyers 1996)	4.9	127
Dunmow, Essex (Bridge 1999b)	4.6	62
Thetford, Norfolk (Groves 2002)	4.5	135
Debenham, Suffolk (Bridge 2001)	4.3	122
Ford, West Sussex (Bridge 2000b)	4.3	92
Oldmans, Shropshire (Miles 1996)	4.2	67
Castle Acre, Norfolk (Tyers 2000)	4.1	114
Owston, Leicestershire (Howard *et al* 1998)	4.1	80

Table 4: Ring width data for the site chronology INGHAM

ring widths (0.01mm)	no of trees

INGHAM AD 1243 - 1377

276	274	253	118	176	153	186	180	221	201	1	1	1	1	1	2	2	2	2	2
256	274	188	148	267	236	258	190	206	207	2	2	2	2	2	2	2	2	2	2
105	112	137	162	133	195	161	204	196	156	2	2	2	2	2	3	3	3	3	3
191	81	148	175	299	151	195	297	315	282	3	3	3	3	3	3	3	3	3	3
226	244	181	212	157	151	235	229	146	192	3	3	3	3	3	3	3	3	3	3
188	134	155	151	147	110	123	101	154	87	3	3	3	3	3	3	3	3	3	3
72	120	65	83	128	98	82	81	59	81	3	3	3	3	3	3	3	3	3	3
66	105	128	141	107	110	128	112	88	96	3	3	3	3	3	3	3	3	3	3
69	74	80	51	74	88	78	92	58	42	3	3	3	3	3	3	3	3	2	2
58	58	44	52	49	63	63	55	58	86	2	2	2	2	2	2	2	2	2	2
82	87	91	114	85	115	118	101	115	100	2	2	1	1	1	1	1	1	1	1
97	81	84	107	112	85	129	84	59	41	1	1	1	1	1	1	1	1	1	1
120	96	77	81	79	120	96	70	52	59	1	1	1	1	1	1	1	1	1	1
62	88	80	90	61						1	1	1	1	1					