

## DUBLIN MEDIEVAL DENDROCHRONOLOGY

MICHAEL G. L. BAILLIE

Palaeoecology Laboratory  
The Queen's University, Belfast

### ABSTRACT

Large scale urban excavations since 1969 have yielded timber structures, within archaeological contexts of the 10th to 14th centuries, in the City of Dublin. Two oak chronologies have resulted from dendrochronological work in the area spanning A.D. 885 to 1306 and A.D. 1357 to 1556. These chronologies should allow the precise dating of oak timbers from subsequent excavations in the area and will form the basis of an eventual continuous Dublin chronology.

Des travaux urbains de grande envergure se poursuivant depuis 1969 dans la Ville de Dublin ont mis en évidence des structures en bois situées dans des contextes archéologiques datés du 10<sup>e</sup> au 14<sup>e</sup> siècles. L'étude dendrochronologique de ce matériel a permis l'élaboration de deux chronologies basées sur le chêne, l'une s'étendant de 855 A.D. à 1306 A.D., l'autre de 1357 A.D. à 1556 A.D. Ces chronologies permettront des datations précises des poutres de chêne provenant des fouilles à réaliser dans la même région et forment la base d'une éventuelle chronologie continue à Dublin.

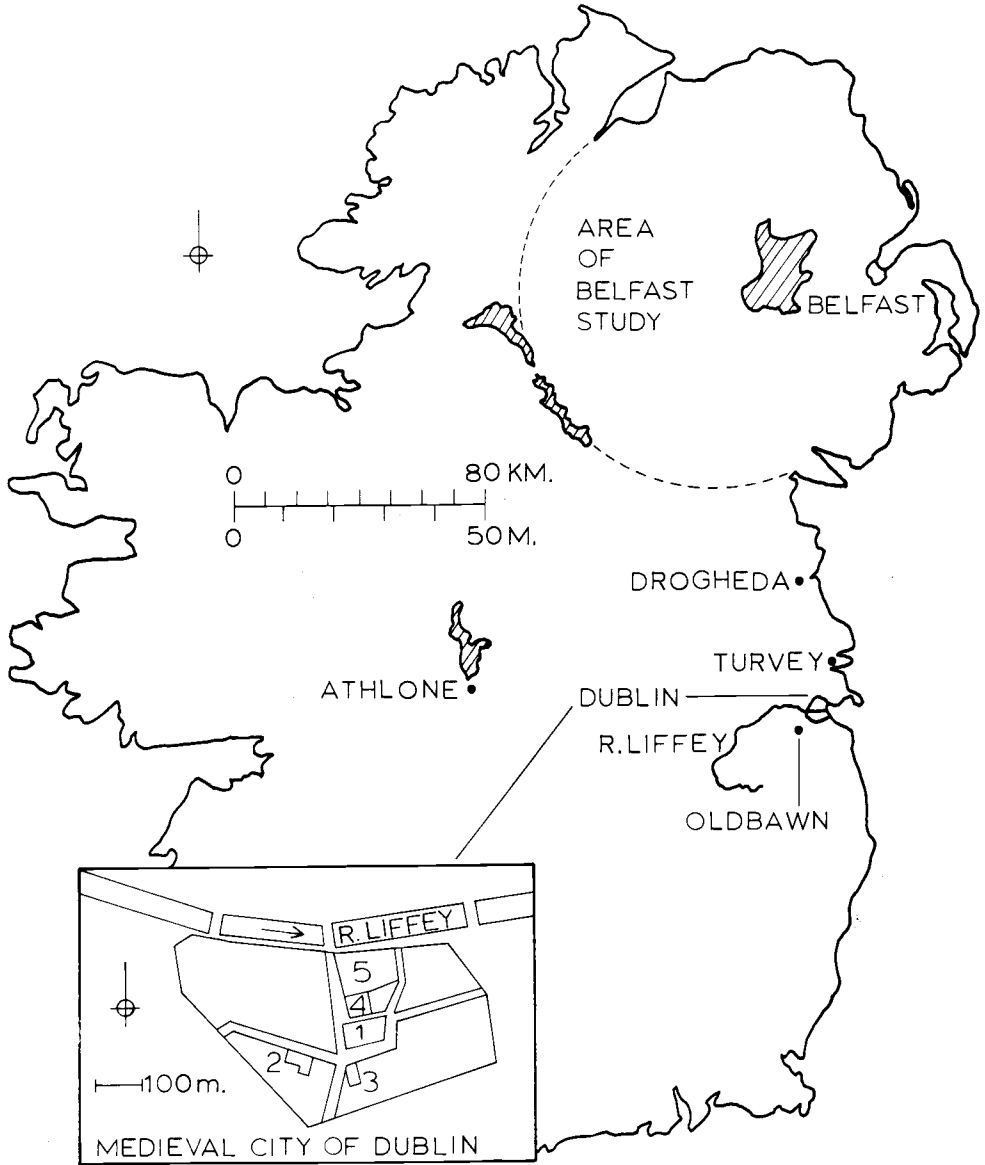
Umfangreiche, seit 1969 in Dublin durchgeführte Stadtkerngrabungen haben Holzkonstruktionen aufgedeckt, die innerhalb archäologischer Zusammenhänge zwischen dem 10. und 14. Jahrhundert liegen. Durch ihre dendrochronologische Bearbeitung sind zwei Eichenholzchronologien entstanden, die die Perioden von 855 bis 1306 und von 1357 bis 1556 überspannen. Diese Chronologien werden die genaue Datierung von Eichenholz aus weiteren Grabungen in diesem Gebiet ermöglichen und die Grundlage für eine kontinuierliche Dublin-Chronologie darstellen.

### INTRODUCTION

Between 1969 and 1976 extensive excavations were carried out on sites at High Street, Winetavern Street, and Christchurch Place within the medieval city of Dublin and at Woodquay which lies between the medieval city wall and the River Liffey (Figure 1). These sites contained extensive waterlogged organic deposits in which timbers and timber structures were frequently preserved along with outstanding archaeological remains reflecting almost every aspect of medieval life (Ó Ríordáin 1971).

In general terms the sites could be divided into an earlier, 10th to 12th century, phase when the predominant heavy timber was ash and a later, 12th to 14th century, phase when the most widely used timber was oak. Those two phases were more or less coincident with the Viking and Norman periods respectively. The dendrochronological work discussed below was restricted to oak timbers and hence mostly to structures of the Norman period. The initial results formed the partial basis of a thesis submitted in 1973 (Baillie 1973). At that time a 450 year floating chronology was in existence covering the approximate period A.D. 850 to 1300. This tentative dating was based on the archaeological association of timber structures with coins and other datable objects.

In the construction of the 450 year floating chronology two categories of timbers were used: firstly timbers from stratigraphically related structures and secondly any



**Figure 1.** Ireland showing timber sources. *Inset 1*, Christchurch Cathedral; 2, High Street; 3, Christchurch Place; 4, Winetavern Street; 5, Woodquay.

timbers which exhibited long ring patterns. The latter were collected with the aim of achieving the maximum extension of the chronology back in time. The only timbers avoided in this early work were those bearing evidence of having derived from ships or boats. This discrimination assumed that ship timbers might have exotic origins; more recent work has shown a strong possibility that the majority of ship derived timbers from the Dublin sites were in fact local in origin (Baillie 1977a).

The floating chronology was based on two principal groups of timbers derived from a plank floor and house frame TFS 2, (Timber Framed Structure) and TFS 3 respectively. Stratigraphically these structures, excavated at High Street, bore a close relationship in that TFS 2 was overlain by a later post and wattle wall which was subsequently cut through by TFS 3. When the ring patterns from the individual timbers of these structures were cross matched and submasters produced, it was found that TFS 2 predated TFS 3 by 106 years (Baillie 1977b). The cross correlation between the submasters gave a value of  $t = 11.1$  for an overlap of 154 years using the Belfast CROS program (Baillie and Pilcher 1973).

The 391 year chronology, resulting from the combination of the TFS 2 and TFS 3 submasters, was extended using ring patterns from other structures and from miscellaneous long lived timbers. In total a chronology of 452 years was produced. This chronology is listed in index format in Table 1.

The major question in 1973 was the absolute dating of the Dublin chronology. As a floating chronology it was of use in assigning relative dates to a number of important pits, houses, wharfs, etc. However, the importance of some of the associated groups of objects, from an archaeological point of view, demanded precise dating. Various strands of evidence, including a cross agreement ( $t = 4.14$ ) with the then unconsolidated extension to the Belfast chronology (Baillie 1977c) suggested that the Dublin 452 year chronology started in the year A.D. 855. It was felt, in 1973, that a desirable approach would be to complete an independent Dublin area chronology. That is, to extend the tentatively dated floating chronology forward in time to cross match with material of known date.

## PROBLEMS IN EXTENDING THE DUBLIN CHRONOLOGY

Material to extend the Dublin chronology could have come from two sources. Logically the excavations themselves could have produced timbers of the 14th, 15th, and 16th centuries. Alternatively historic buildings from the area could have supplied ring patterns which would extend back to join with the floating chronology. However the problem was not to be a simple one.

Extensive sampling of timbers, on all the Dublin sites, over several excavation seasons, failed to produce any ring patterns which extended the 452 year chronology forward in time. The vast majority of oak timbers studied belonged to the 13th century. One group of posts, from high up in an unexcavated baulk at Christchurch Place, did however yield a 200 year ring pattern which could not be crossdated with the existing Dublin chronology. It was assumed that this 200 year chronology had to be later than the 452 year chronology and this was confirmed when crossdating was obtained between the baulk timbers and a group from Bathe House, Drogheda.

All that remains of Bathe House are two inscribed and decorated beams preserved in the National Museum of Ireland in Dublin. This Tudor House stood in Drogheda until the first quarter of the 19th century and one of the beams bears the date A.D. 1570. In addition it is believed that the oaks used in the construction of the



house were derived from Mellifont Park, an implicit Irish origin (McCracken 1971:73-77). The two beams yielded adequate cores and, in addition, two tenons, cut off when the building was demolished, were preserved in mortices in one of the beams. The four resulting ring patterns agreed precisely with those from the Christchurch Place baulk. The presence of a heartwood-sapwood transition on one of the Bathe House timbers suggested that, with the recorded date of building being 1570, the ring patterns would end in the 16th century. Subsequently a 200 year floating medieval chronology was produced from these timbers and from further samples from Turvey Castle and Oldbawn House, both Co. Dublin, and Christchurch Cathedral, Dublin. This chronology exhibited strong cross agreement with the chronologies from Belfast and the England-Wales border area (V. Giertz, personal communication). In both cases the 200 year Dublin chronology ended in the year A.D. 1556, the cross agreement values being  $t = 7.1$  and  $6.0$  respectively (Figure 2).

This later Dublin chronology spanned the years A.D. 1357 to 1556. It is listed in index format in Table 2.

With the exception of the single timber from Christchurch Cathedral, each of these sources of later medieval timbers yielded at least one example which started life in the second half of the 14th century. No examples were found which started life earlier. This appeared to support the finding, from the north of Ireland that there was a depletion/regeneration phase for oaks at that time (Baillie 1977c). In the light of this finding the short term hope of bridging the 14th century with independent Dublin area material had to be given up.

### DATING OF THE 452 YEAR DUBLIN CHRONOLOGY

Until 1977 no further progress was made with the Dublin chronology. In 1977 the acquisition of crannog timbers of the 15th century, from the north of Ireland, finally confirmed the Belfast extension to 1001 (Baillie 1977c). This in turn confirmed the dating of the Dublin chronology as A.D. 855 to 1306 (see above). Shortly after this confirmation the opportunity arose to compare the Dublin chronology with the eastern English REF 6 chronology which spans the years A.D. 780 to 1193 (Fletcher 1977). This chronology, dated by cross agreement with the established German chronologies ( $t = 7.53$  compared with the Hollstein (1965) chronology) shows excellent cross agreement with the Dublin chronology for the mutual period A.D. 855 to 1193 ( $t = 6.6$ ). Thus we have independent replication of the Dublin-Belfast dating.

Further independent verification of the relative positions in time of these two Dublin chronologies was provided by the ring patterns from Lincluden College, Dumfries. This 400 year chronology spanning the period A.D. 1068 to 1467 cross matched with both the Dublin A.D. 855 to 1306 and A.D. 1357 to 1556 chronologies with  $t = 4.9$  and  $6.8$  respectively for overlaps of 239 and 111 years (Baillie 1977d).

### CONCLUSION

It will be some time before a continuous, A.D. 855 to present, chronology will be available for the Dublin area. The depletion/regeneration phase in the 14th century is duplicated with a vengeance in the late 17th-early 18th centuries, due to massive exploitation at that time, and the chances of finding long lived modern oaks in the Dublin area are slight. Hopefully for the medieval period most dating problems can be resolved using the chronologies presented here.

**Table 2.** Dublin oak master chronology, A.D. 1357 to 1556.

Date	Tree Ring Indices										Number of Samples									
	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
1357							119	113	103											
1360	76	95	66	63	87	109	120	106	68	141		1	2	2	2	2	2	2	2	1
1370	108	84	98	80	127	123	144	81	115	114		2	2	2	2	2	2	2	2	2
1380	104	109	112	118	120	108	123	92	98	97		2	3	4	5	6	6	6	7	7
1390	107	120	90	128	91	93	109	104	109	96		7	7	7	7	7	7	8	8	8
1400	115	87	50	86	85	116	117	92	95	105		8	8	8	8	8	8	8	8	8
1410	77	59	84	71	82	81	74	113	95	67		8	8	8	8	8	8	8	8	8
1420	125	121	81	128	108	121	122	64	83	92		9	9	9	9	9	9	9	9	9
1430	77	125	152	139	143	139	113	143	119	94		10	10	11	11	11	11	11	12	12
1440	86	74	60	51	65	71	74	95	85	93		12	12	13	13	13	13	13	13	13
1450	74	79	93	116	128	94	108	74	101	106		13	13	13	13	13	13	13	12	12
1460	107	126	118	112	92	118	138	129	89	59		12	12	12	12	12	12	12	13	13
1470	63	74	89	100	124	134	129	102	80	71		13	13	13	13	13	13	12	12	12
1480	95	119	115	114	106	138	152	131	78	74		12	12	12	12	12	12	12	12	12
1490	75	87	89	97	118	131	146	118	92	115		12	12	12	12	12	12	12	12	12
1500	108	89	82	82	89	85	101	89	94	110		12	12	12	12	12	12	12	12	12
1510	85	103	100	105	103	101	94	88	109	104		12	12	12	12	12	12	12	12	12
1520	96	81	95	102	93	85	84	104	104	108		12	12	12	12	12	12	12	12	12
1530	83	95	81	101	95	112	111	125	97	101		12	12	11	11	11	10	9	9	9
1540	115	106	96	124	104	101	98	110	110	102		9	9	8	8	8	7	6	4	4
1550	107	113	81	74	107	98	126					4	4	3	3	3	3	3	3	3

Further work is needed to assess the area to which these chronologies are applicable. The cross agreements with other British Isles chronologies lend hope that the area served may be considerable. Other information tends to confirm this. For example, a single 267 year ring pattern from Athlone, 110 km west of Dublin, shows good visual cross agreement with the early Dublin chronology for the years A.D. 872 to 1138 ( $t = 5.9$ ).

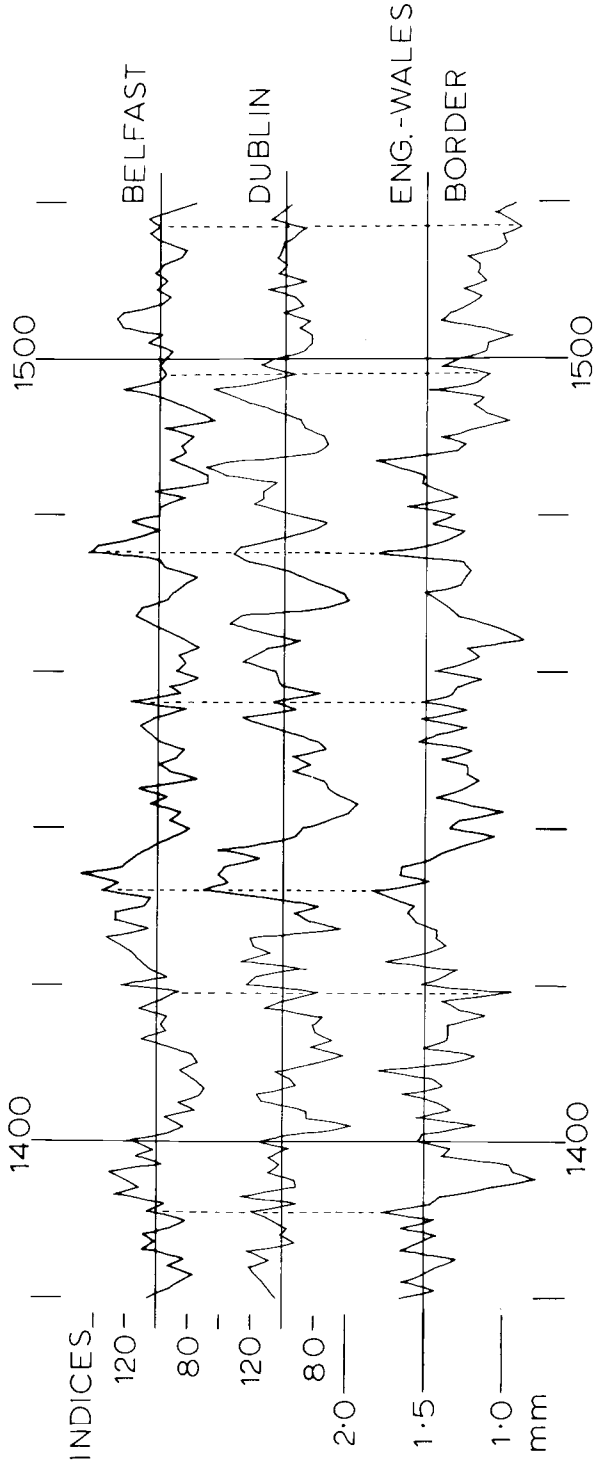
Where possible every effort has been made to ensure that these chronologies have been constructed using ring patterns from locally grown oaks. All of the available evidence suggests that they can be localized to the Dublin area with a high degree of certainty and hence can ultimately be used not only for dating purposes but for possible attribution of 'exotic' ship timbers found in excavation contexts in Ireland or elsewhere (Baillie 1977a). A similar approach might ultimately allow the attribution of 'problem' art historical timbers such as those forming the Netherlands Chronology II (Eckstein et al 1975) and the related English REF 1-3 chronologies (Fletcher 1977).

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#### REFERENCES

- Baillie, Michael G.L.  
 1973 A dendrochronological study in Ireland, with reference to the dating of medieval and post-medieval timbers. MS, Doctoral dissertation, The Queen's University, Belfast.  
 1977a Dating of some ships' timbers from Woodquay, Dublin. In Proceedings of the First International Symposium on Dendrochronology in Northern Europe, edited by J. M. Fletcher and S. McGrail. *British Archaeological Reports* (in press).  
 1977b Recent dendrochronological results from modern and historic Irish oak timbers. In *Dendrochronologie und Postglaziale Klimaschwankungen in Europa*, edited by B. Frenzel, pp. 9-15. Franz Steiner Verlag, Wiesbaden.  
 1977c The Belfast oak chronology to A.D. 1001. *Tree-Ring Bulletin* 37:1-12.  
 1977d An oak chronology for south central Scotland. *Tree-Ring Bulletin* 37:33-44.
- Baillie, M. G. L. and J. R. Pilcher  
 1973 A simple crossdating program for tree-ring research. *Tree-Ring Bulletin* 33:7-14.
- Eckstein, D., J. A. Brongers, and J. Bauch  
 1975 Tree-ring research in the Netherlands. *Tree-Ring Bulletin* 35:1-13.
- Fletcher, J. M.  
 1977 Tree-ring chronologies for the 6th to 16th centuries for oaks of southern and eastern England. *Journal of Archaeological Science* 4:335-52.
- Hollstein, E.  
 1965 Jahrringchronologische Datierung von Eichenhölzern ohne Waldkante. *Bonner Jahrbücher* 165:12-27.
- McCracken, E.  
 1971 *The Irish woods since Tudor times*. The Queen's University of Belfast, Institute of Irish Studies, Newton Abbot.
- Ó Ríordáin, B.  
 1971 Excavations at High Street and Winetavern Street, Dublin. *Medieval Archaeology* 15:73-85.



**Figure 2.** Comparison of the Belfast and Dublin index chronologies for the 15th century with the England-Wales Border mean chronology (after Giertz).