Darganfod Hen Dai Cymreig
Discovering Old Welsh Houses

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Discovering Old Welsh Houses studies and celebrates the traditional houses of North Wales and the lives of the people who lived in them.

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Please note that these reports are being updated as part of an ongoing programme of revision. Older reports sometimes refer to the old names of the Group. Between 2005 and 2012 also known as The Snowdonia Dendrochronology Project, then the N W Wales Dendrochronology Project and then the Dating Old Welsh Houses Group.

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Oxford Dendrochronology Laboratory
Interim Report 2014/10

THE TREE-RING INVESTIGATION OF A FIREPLACE LINTEL AT OERDDWR-ISAF, BEDDGELERT

(NGR SH 5907 4543)

Summary

Cores extracted from the fireplace lintel contained too few rings for dendrochronological dating. Sections from either end of a core (a known number of years apart) have been submitted for radiocarbon analysis, with the results expected in late September/early October 2014.

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A Tree-Ring Investigation of a Fireplace Lintel, Oerddwr-Isaf, Beddgelert (NGR SH 5907 4543)

BACKGROUND TO DENDROCHRONOLOGY

The basis of dendrochronological dating is that trees of the same species, growing at the same time, in similar habitats, produce similar ring-width patterns. These patterns of varying ring-widths are unique to the period of growth. Each tree naturally has its own pattern superimposed on the basic 'signal', resulting from genetic variations in the response to external stimuli, the changing competitive regime between trees, damage, disease, management etc.

In much of Britain the major influence on the growth of a species like oak is, however, the weather conditions experienced from season to season. By taking several contemporaneous samples from a building or other timber structure, it is often possible to cross-match the ring-width patterns, and by averaging the values for the sequences, maximise the common signal between trees. The resulting 'site chronology' may then be compared with existing 'master' or 'reference' chronologies.

This process can be done by a trained dendrochronologist using plots of the ring-widths and comparing them visually, which also serves as a check on measuring procedures. It is essentially a statistical process, and therefore requires sufficiently long sequences for one to be confident in the results. There is no defined minimum length of a tree-ring series that can be confidently cross-matched, but as a working hypothesis most dendrochronologists use series longer than at least fifty years.

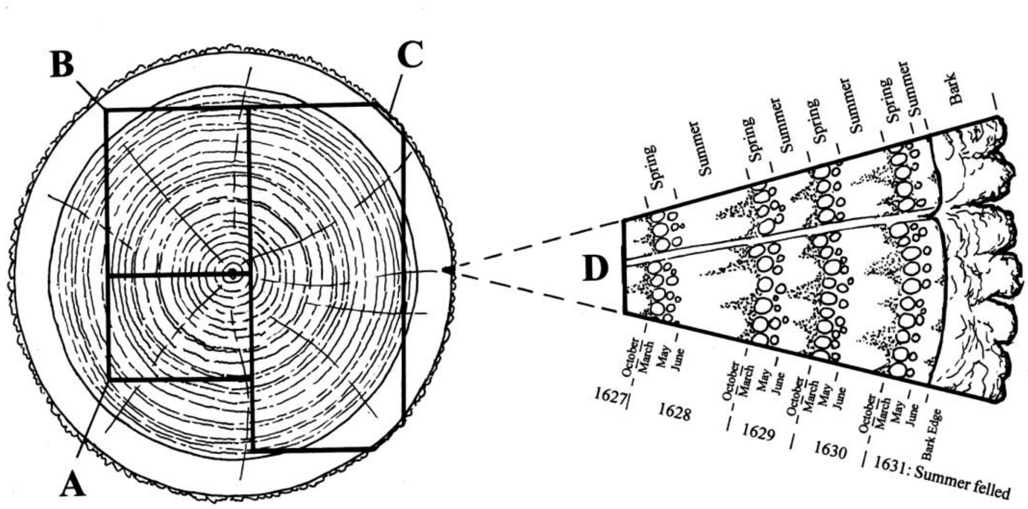
The dendrochronologist also uses objective statistical comparison techniques, these having the same constraints. The statistical comparison is based on programs by Baillie & Pilcher (1973, 1984) and uses the Student's *t*-test. The *t*-test compares the actual difference between two means in relation to the variation in the data, and is an established statistical technique for looking at the significance of matching between two datasets that has been adopted by dendrochronologists. The values of '*t*' which give an acceptable match have been the subject of some debate; originally values above 3.5 being regarded as acceptable (given at least 100 years of overlapping rings) but now 4.0 is often taken as the base value. It is possible for a random set of numbers to give an apparently acceptable statistical match against a single reference curve – although the visual analysis of plots of the two series usually shows the trained eye the reality of this match. When a series of ring-widths gives strong statistical matches in the same position against a number of independent chronologies the series becomes dated with an extremely high level of confidence.

One can develop long reference chronologies by cross-matching the innermost rings of modern timbers with the outermost rings of older timbers successively back in time, adding data from numerous sites. Data now exist covering many thousands of years and it is, in theory, possible to match a sequence of unknown date to this reference material.

It follows from what has been stated above that the chances of matching a single sequence are not as great as for matching a tree-ring series derived from many individuals, since the process of aggregating individual series will remove variation unique to an individual tree, and reinforce the common signal resulting from widespread influences such as the weather. However, a single sequence can be successfully dated, particularly if it has a long ring sequence.

Growth characteristics vary over space and time, trees in south-eastern England generally growing comparatively quickly and with less year-to-year variation than in many other regions (Bridge, 1988). This means that even comparatively large timbers in this region often exhibit few annual rings and are less useful for dating by this technique.

When interpreting the information derived from the dating exercise it is important to take into account such factors as the presence or absence of sapwood on the sample(s), which indicates the outer margins of the tree. Where no sapwood is present it may not be possible to determine how much wood has been removed, and one can therefore only give a date after which the original tree must have been felled. Where the bark is still present on the timber, the year, and even the time of year of felling can be determined. In the case of incomplete sapwood, one can estimate the number of rings likely to have been on the timber by relating it to populations of living and historical timbers to give a statistically valid range of years within which the tree was felled. For this region the estimate used is that 95% of oaks will have a sapwood ring number in the range 11 – 41 (Miles 1997).



Section of tree with conversion methods showing three types of sapwood retention resulting in **A** *terminus post quem*, **B** a felling date range, and **C** a precise felling date. Enlarged area **D** shows the outermost rings of the sapwood with growing seasons (Miles 1997, 42)

OERDDWR-ISAF

An upland farmstead of medieval origin sited about 120m. above O.D. The present house appears to incorporate part of the medieval fabric of a hall-house whose platform extends beyond the present three-bay house. The truncated house was of croglofft type with an upper-end chimney, cruck-truss central to an open hall and passage, and a re-set partition truss with a lapped collar (probably a re-used section of cruck blade) replacing a morticed collar. Description in RCAHMW, Caernarvonshire Inventory II (1960), 22, no. 709.

SAMPLING

Sampling took place in February 2014. An oak (*Quercus* spp.) fireplace lintel was cored using a 15mm diameter borer attached to an electric drill. The samples were removed for further preparation and analysis. Initial investigation revealed that the ring series was too short for dendrochronological dating, but samples were removed from each end of the core (a known number of years apart) and submitted to the Oxford University Radiocarbon Laboratory for analysis.

RESULTS AND DISCUSSION

Results from the radiocarbon analysis are expected in late September/early October when it is hoped that it may be possible to 'wiggle match' the results from either end of the core and produce a reliable date for the material

ACKNOWLEDGEMENTS

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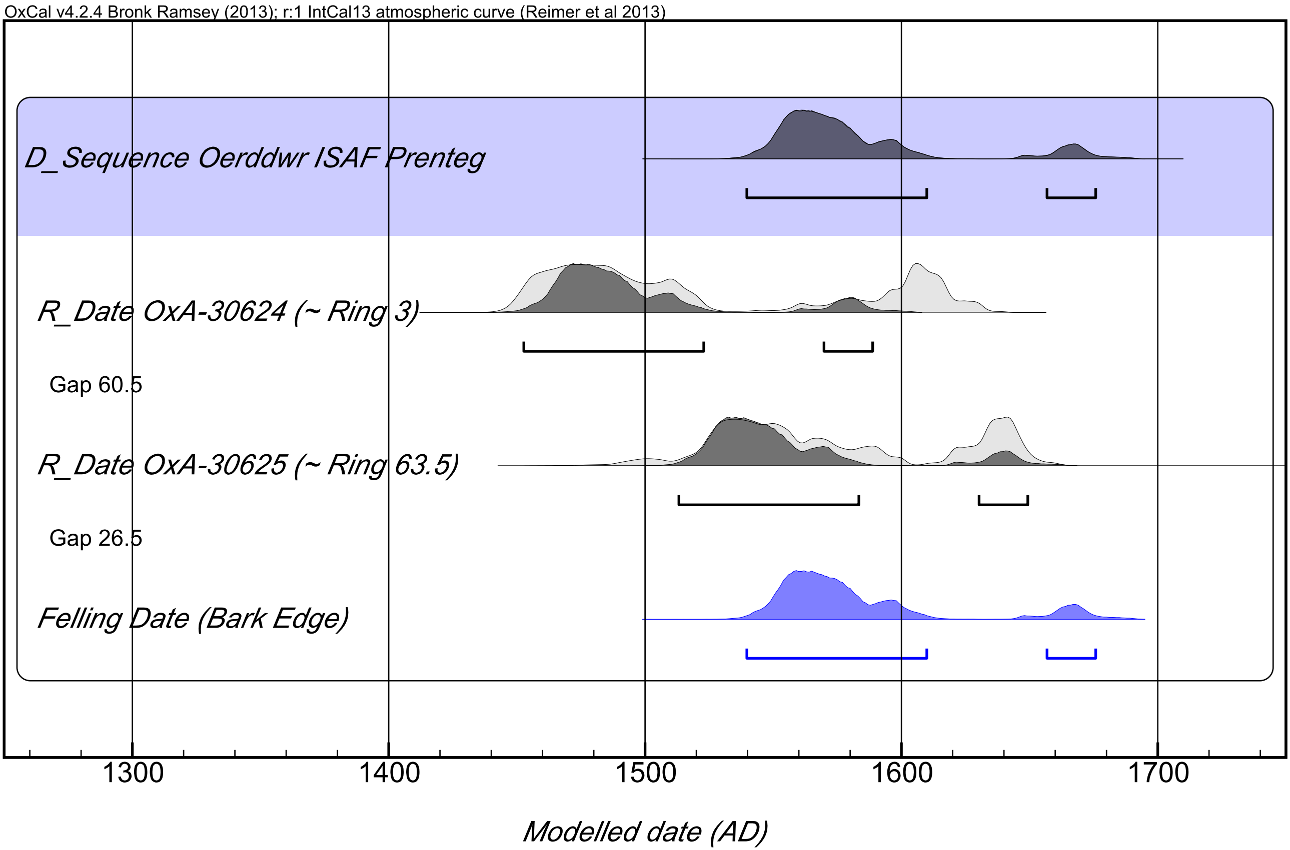
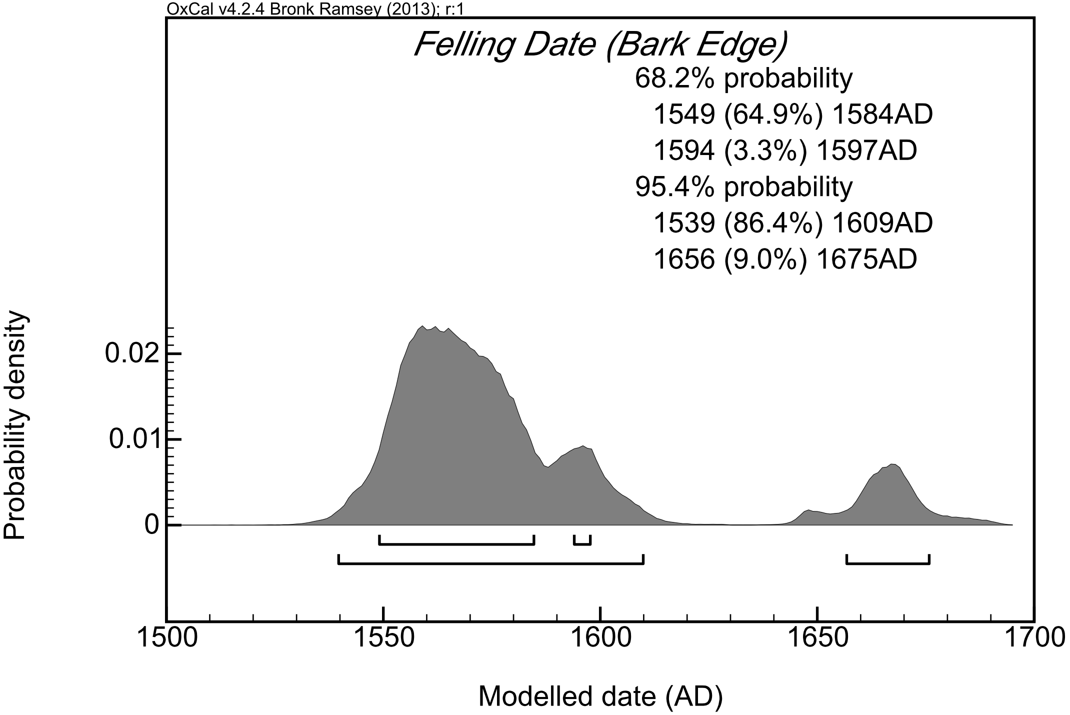
C14 Results Ox Cal Lab


OxCal v4.2.4 Bronk Ramsey (2013); r:1 IntCal13 atmospheric curve (Reimer et al 2013)
D_Sequence Oerddwr ISAF Prenteg
R_Date OxA-30624 (~ Ring 3)
Gap 60.5
R_Date OxA-30625 (~ Ring 63.5)
Gap 26.5
Felling Date (Bark Edge)
1300
1400
1500
1600
1700
Modelled date (AD)

C14 Results Ox Cal Lab


OxCal v4.2.4 Bronk Ramsey (2013); r:1
Felling Date (Bark Edge)
68.2% probability
1549 (64.9%) 1584AD
1594 (3.3%) 1597AD
95.4% probability
1539 (86.4%) 1609AD
1656 (9.0%) 1675AD
Probability density
0.02
0.01
0
1500
1550
1600
1650
1700
Modelled date (AD)