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Oxford Dendrochronology Laboratory
Report 2010/44

THE TREE-RING DATING OF
Tŷ MAWR and BARN
Druid. (Edeyrnion, Merioneth)
Denbighshire
(SJ 0354 4314)
1539-69

Houses Description

A cruck-framed hall of 'gentry' type with a two-bayed open hall, a dais partition of post-and-panel type with evidence for a canopy. The central truss is archbraced but not cusped. Tree-ring dating establishes that in or shortly after 1584 the fireplace was inserted against the central truss. The hall was truncated and a storeyed house of end-chimney lobby-entry type created. The adjacent cruck-framed barn is broadly contemporary with the reconstruction of the house. The timbers had been reputed to have been re-used from a local medieval church, but investigation of the frame suggests that the crucks were felled and used primarily for the barn. *Detailed survey (2009) commissioned by NWWDP deposited in the NMRW.*

Richard Suggett, RCAHMW.

The present list includes sampling commissioned by the Royal Commission (RCAHMW), & the North-West Wales Dendrochronology Project (in association with RCAHMW). The North-West Wales Dendrochronology Project (NWWDP) is a community-based project which aims to date historic houses throughout the historic counties of north-west Wales.

A total of 13 buildings were assessed for dendrochronological potential in Gwynedd – Arfon & Dwyfor (excluding Llŷn). Of these, seven were selected for sampling in this study and results were obtained from 5. Sampling in Gwynedd (Merioneth and Caernarfonshire) is often difficult because of fast-grown timber. Medieval houses dating from before 1400 remain elusive. Hallhouses that have been dated are within the ranges already established for gentry and peasant halls. The apparently coeval fireplace and hall-truss at **Tyn-llan** suggests that some hallhouses may have had enclosed fireplaces in the early sixteenth century. The first generation of storeyed houses of Snowdonian type are surprisingly early, pre-dating the general insertion of fireplaces in hallhouses from about 1575. Several C15th and C16th town-houses were dated in Beaumaris, Caernarfon and Conway, and are a very useful addition to our knowledge of urban buildings.

Detailed surveys of many of the houses sampled are available in the National Monuments Record of Wales (NMRW), the public archive of the Royal Commission

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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 these 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 data sets 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 1997a).

Tŷ MAWR and BARN Druid. (Edeyrnion, Merioneth) Denbighshire (SJ 0354 4314)

(a) Primary phase hall house *Felling date range: 1539-69*

(b) Inserted floor *Felling date: Summer 1584*

(c) Cruck BAEN *Felling date range: 1566-96*

(a) Purlin 1537(h/s); Cruck 1522(4);

(b) Transverse beam 1583(15½C); Longitudinal beam (0/1);

(c) Cruck (1/2) 1556(1).

Site Master 1440-1583 DENBY1 ($t = 10.2$ NORTH; 9.8 SALOP95; 9.6 WALES97).

Oxford Dendrochronology Laboratory

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