



# Darganfod Hen Dai Cymreig Discovering Old Welsh Houses

Tree Ring Dating

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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.

New reports will be added from time to time. Keep an eye on our website for updates.



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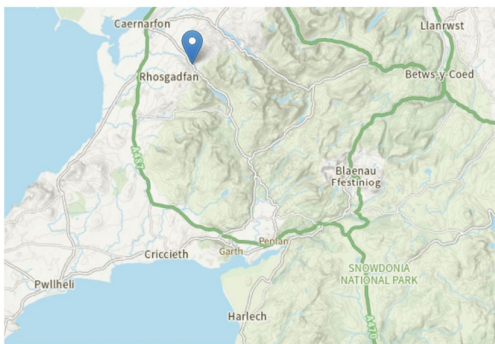
**TREE-RING DATING OF  
LLWYN BEDW  
BETWYS GARMON  
(CAERNARFONSHIRE)  
GWYNEDD**

**(NGR SH 530 583)**

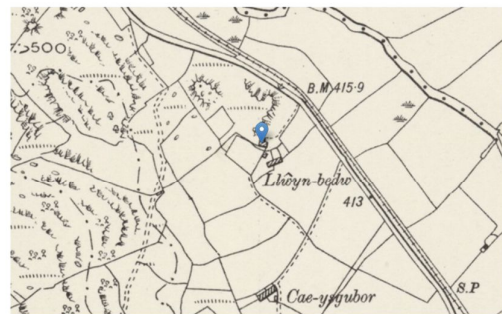


Tree-ring dating was commissioned by the Beddgelert Historical Society in association with the Royal Commission on the Ancient and Historical Monuments of Wales, Cadw and Snowdonia National Park. The work was carried out by the Oxford Dendrochronology Laboratory, Mill Farm, Mapledurham, Oxfordshire RG4 7TX (Dr Dan Miles). Additional research by Margaret Dunn and Richard Suggett.

**1 SUMMARY**



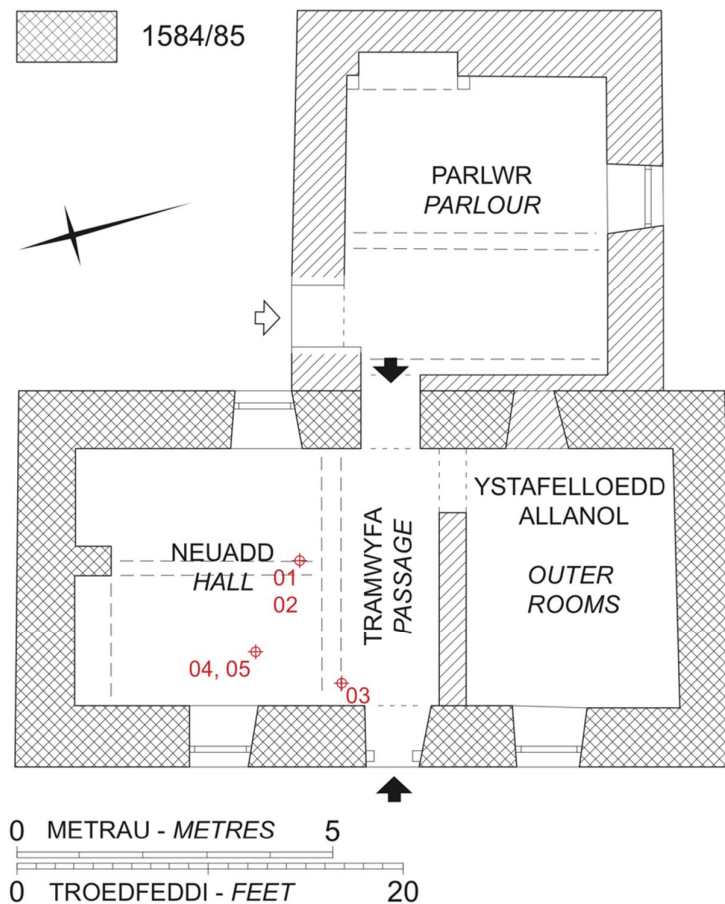
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A stone-built, storeyed, gentry house situated by a knoll at 130m O. D. above the valley bottom. It consists of a main range and a wing. The main range (left photograph above) conforms to the Snowdonian plan type with a hall, heated by a gable-end fireplace with evidence of there having been an adjacent mural stair; a cross passage, rearranged to accommodate a central stair; and an outer room (with evidence of a plank and muntin

screen). The axial ceiling beam to the hall gave a tree-ring felling date of winter 1584/5, making construction likely in **1584**, or within a year or two thereafter. While there is a little uncertainty as to whether the dated timber is primary or secondary, the likelihood is that it is coeval with the construction of the main range.

A parlour wing (right photograph above) appears to be earlier, the westernmost rooms removed when the main range was built. The substantial timbers were not sampled. The purlins may relate to the original roof but, if so, have been re-positioned. The wing has a plaster overmantel containing the greater part of a plaster shield. Although it is damaged, the arms are clearly those of Collwyn (or Golwyn) ap Tangno (sable, between three fleur de lys a chevron argent) an 11<sup>th</sup>-century figure who claimed descent from one of the fifteen tribes of Gwynedd. It appears overly large for its present position but oral evidence indicates that it was here in the 19<sup>th</sup> century. The fireplace mantel beam is corbelled out and may belong to the primary building phase, the plaster shield being a late-16<sup>th</sup> century embellishment.



Plan from *Discovering the Historic Houses of Snowdonia*, 208. Crown Copyright: RCAHMW. The red numbers mark the location of the tree-ring samples.

In 1583 Roland ap William ap John, freeholder, conveyed Llwyn Bedr (his ‘capital message’) to feoffees for his own use and that of his son and heir after his death. The house was built shortly after this transaction. The shield may date from this period: such heraldic devices grew in popularity in N W Wales from the 1580s and into the 17<sup>th</sup> century. It would

have been a major statement on the part of Roland, advertising his supposed links with the ancient Welsh aristocracy. The house remained in the family until 1734 when it was tenanted for the first time; it was remodelled in the late 18<sup>th</sup> or early 19<sup>th</sup> century.

Llwyn Bedw is discussed in detail in *Discovering the Historic Houses of Snowdonia*, 208-11. Readers are referred to the house history by Margaret Dunn, which contains fuller information and full references. Details, including digital photographs, may be found in the National Monuments Record database at <https://coflein.gov.uk/en/site/26729/archives?term=Llwyn%20bedw>

RCAHMW National Primary Record Number (NPRN) 26729.

## 2 TECHNICAL DATA

The following summary of technical data regarding Llwyn Bedw is taken from *Vernacular Architecture* 38 (2007), 134; <https://doi.org/10.1179/174962907X248092>.

Key to abbreviations: Complete sapwood is indicated by 'C' and where the character of the final ring has been identified, the seasonal felling dates are given: winter (C), October to February. For 't', see next section, which discusses reference chronologies (site masters) – in general, the higher the 't' value the more secure the dating.

### ***Felling date: Winter 1584/5***

Secondary ceiling beam 1584(47C, 42C); Axial beam (O/1); Joists (0/2). *Site Master* 1504-84 BDGLRTI2 (*t* = 5.5 CLRENDN7; 5.4 OLDHLLFM; 5.2 WILBURY1; 5.1 BERRYPOM)

Four other samples taken could not be dated.

## 3 BACKGROUND TO DENDROCHRONOLOGY (Daniel Miles)

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.



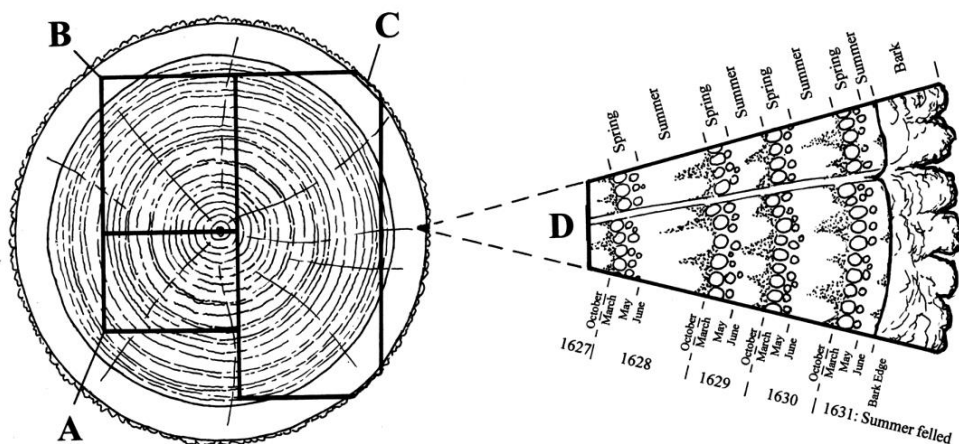
The dendrochronologist also uses objective statistical comparison techniques, these having the same constraints. The statistical comparison is based on programs by Baillie & Pilcher (1973, 1984) and uses the Student's t-test. The t-test compares the actual difference between two means in relation to 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.



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.

Notes compiled by Martin Cherry, June 2022, from material generated by the North-west Wales Tree-ring Dating Project. The origins of this programme of dating lay with the Beddgelert Historical Society under the direction of Margaret Dunn (See the 'About Us' page.) This report should be read in conjunction with the other reports in this section.