



# 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.

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



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**THE TREE-RING DATING OF  
GESAIL GYFARCH  
PENMORFA  
(CAERNARFONSHIRE)  
GWYNEDD**

**(NGR SH 5404 4175)**



The tree-ring sampling and analysis was carried out in 2006 by the Oxford Dendrochronology Laboratory, Mill Farm, Mapledurham, Oxfordshire RG4 7TX (Dr Dan Miles), commissioned by Cymdeithas Hanes Beddgelert in association with the Royal Commission on the Ancient and Historic Monuments of Wales (RCAHMW).

## **1 SUMMARY**

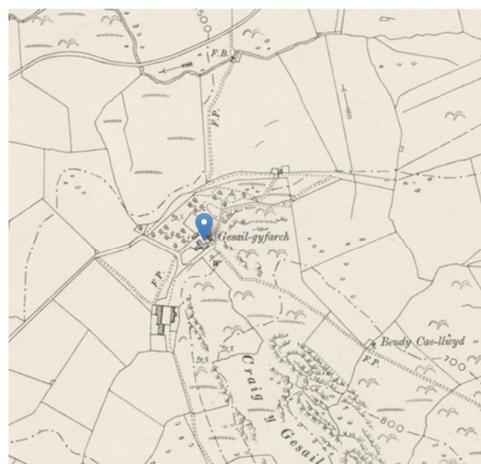
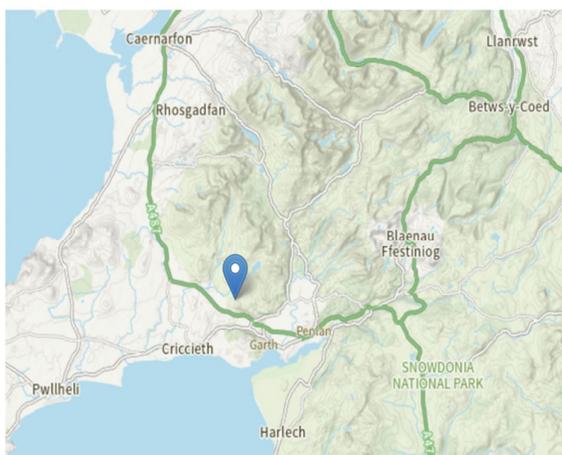
This large, three-storeyed stone-built storeyed house is of classic two-unit Snowdonian plan-type with an end chimney and fireplace stair up to an attic fireplace. A new house was added at right angles upslope in 1821-3, after which time it was used as a store house. Timber detail includes an ovolo-moulded mullioned window and the *in-situ* head-beam of a lost post-and-panel partition: it was this beam together with a number of (probably *in-situ*) joists that provided the felling date of winter **1609-10**, making construction likely in 1610, or within a year or two after this date. The roof-trusses have been replaced. The rear external stair was later demolished or collapsed.

The house is associated with the family of Wynn of Gwydir (the reader is referred to the detailed house history by Margaret Dunn from which the following is derived). Predecessors of this house had a violent and chequered history: nearby is a house platform with associated enclosures that may have been the site of the hall house destroyed by Owain Glyndŵr in 1403 (see RCAHMW, *Caernarvonshire Inventory* II, no. 988, p. 89 that gives sources). This house, either rebuilt or repaired, was owned (from 1462) by Ieuan ap Robert and in the 1460s

it was attacked by outlaws: the case mentions outhouses and upper chambers at the lower end of the hall. It suffered further attacks in 1595, all part of the struggle for power and land so graphically described by Sir John Wynn in his history of the Gwydir family. A direct descendant, Robert Wynn, gentleman, lived here and was assessed in the 1623 Arduwy crown rental: it may well be that he built the present 1610 house. The date of the new house that superseded it is confirmed from accounts in the University of Bangor archives – the house was surveyed in October 1820 and found to be in such a ruinous state that it could not be let and was rebuilt over the period 1821-3 (details in the house history).

Further research and interpretation were undertaken by Margaret Dunn (who wrote the house history) and Richard Suggett. Some historic black and white photographs of the house may be found on Coflein (the online catalogue of archaeology, buildings, industrial and maritime heritage in Wales curated by the RCAHMW) at <https://coflein.gov.uk/en/site/26489>

RCAHMW National Primary Reference Number (NPRN): 26489



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## 2 TECHNICAL DATA

The following summary of technical data regarding Gesail Gyfarch is taken from *Vernacular Architecture* 37 (2006), DOI: 10.1179/174962906X158309.

Key to abbreviations: h/s indicates the presence of the heartwood-sapwood boundary. C signifies the felling date as winter. 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 1609/10**

Joists (2/3) 1609(34C), 1470(2); Transverse beam 1569(h/s); Half-beam (0/1).

Site Master 1384-1609 BDGLRT6 (t= 8.3 WALES97; 7.9 BDGLRT7; 7.8 PENGWERN)

## 3 BACKGROUND TO DENDROCHRONOLOGY (Dan 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.

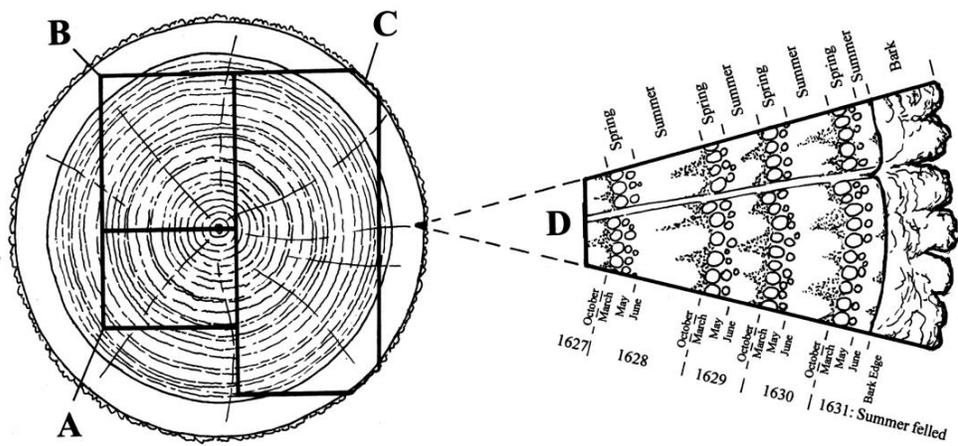
The dendrochronologist also uses objective statistical comparison techniques, these having the same constraints. The statistical comparison is based on programs by Baillie & Pilcher (1973, 1984) and uses the Student's t-test. The t-test compares the actual difference between two means in relation to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





