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.

TREE-RING DATING OF

DERWYN-BACH

(Derwin Bach or Derwydd Bach)

DOLBENMAEN
(Formerly in the parish of Llanfihangel y Pennant)
CAERNARFONSHIRE
(SH 4766 4520)

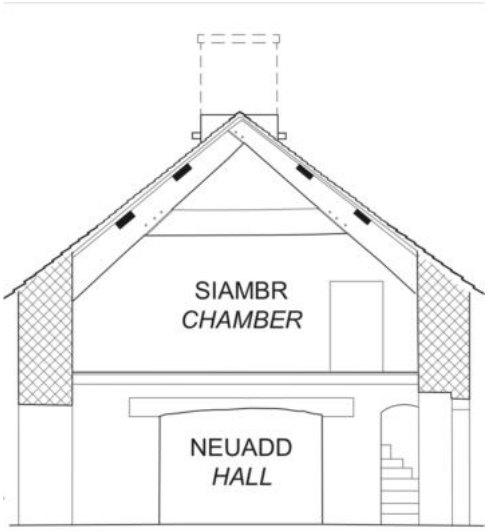
1 SUMMARY

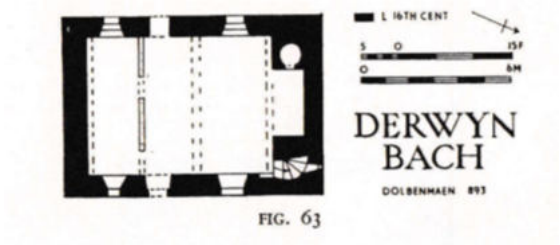
Derwyn-bach is a classic stone-built Snowdonian farm house dating from the middle years of the sixteenth century: felling dates **1549-52** (see technical data below). It is set across a slight slope at 110 m above O.D. close to a ford and also to the site of a temporary Roman camp. Derwyn was a medieval township but if the house has medieval origins nothing of these survives. It was probably built by freeholders who were not of gentry status. By the mid nineteenth century, the holding was about 80 acres in extent and occupied by reasonably prosperous tenants.

The house was fully storeyed from the outset and is two units in plan. To one side of a wide cross passage was a large hall cum kitchen and, to the other, twin outer rooms. The hall is heated by a large fireplace with chamfered bressummer and to one side of this is the opening to a winding stone stair lit by a slit window – a characteristic feature of the mature Snowdonian house – now replaced by a modern flight of stairs. The hall ceiling has stop-chamfered beams and joists and the roof has A-frame trusses, the one over the principal chamber being marked out by its superior detailing. These timbers, which are primary, provided the tree-ring dates.

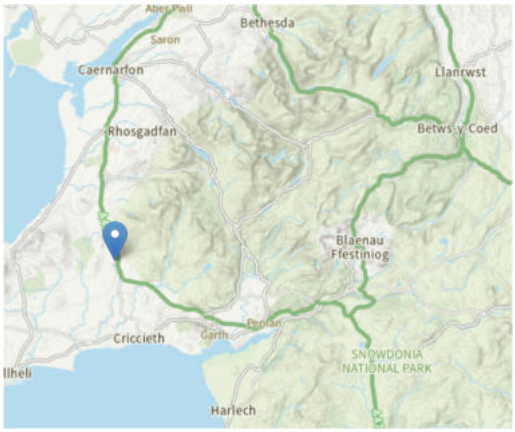
It is recommended that readers refer to the house history (by Margaret Dunn) which provides valuable background. A full analysis may be found in Richard Suggett and Margaret Dunn, *Discovering the Historic Houses of Snowdonia* (RCAHMW, 2014), 184-7. This largely

supersedes the account in the RCAHMW, *Caernarvonshire Inventory II* (1960), 71: the house was then ruinous and restored in the late twentieth century.





Plan from RCAHMW, *Caernarvonshire Inventory II* (1960), 71; section from Richard Suggett and Margaret Dunn, *Discovering the Historic Houses of Snowdonia* (RCAHMW, 2014), 185. © Royal Commission for the Ancient and Historic Monuments of Wales.



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2 TECHNICAL DATA

The following summary of technical data regarding Derwyn-bach is taken from *Vernacular Architecture* 38 (2007), 136 https://doi.org/10.1179/174962907X248092. Key to abbreviations: h/s indicates the presence of the heartwood-sapwood boundary. 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 range: (OxCal modelled) **1549-52** (unrefined 1549-61)

Collar 1520(h/s); Joists 1525(h/s), 1516; *Ex situ* half-beams 1548(30), 1523(1); Rafters 1516(h/s+23 NM, h/s). *Site Master 1385-1548* BDGLRT15 *(t* = 8.0 BDGLRTlO; 8.0 PENGWERN; 7.6 BDGLRT8)

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.

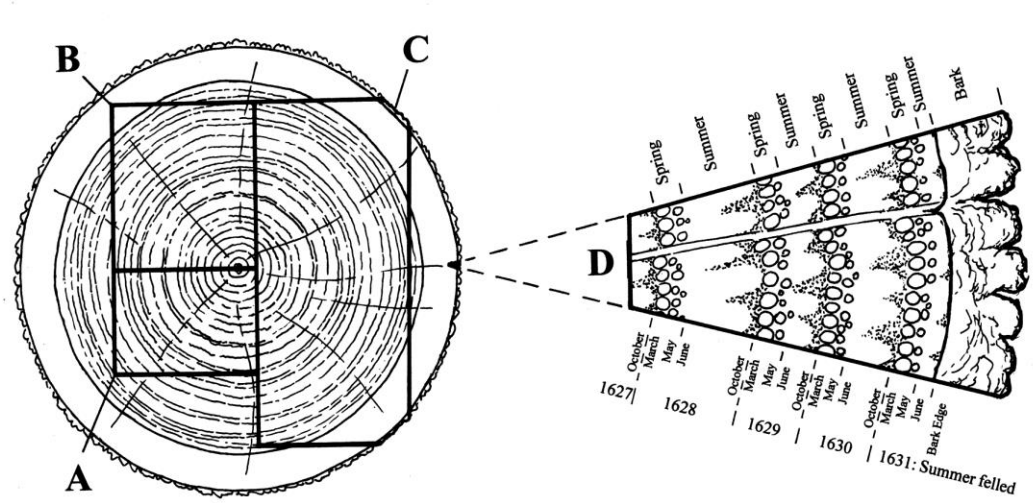
The dendrochronologist also uses objective statistical comparison techniques, these having the same constraints. The statistical comparison is based on programs by Baillie & Pilcher (1973, 1984) and uses the Student's t-test. The t-test compares the actual difference between two means in relation to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

4 ACKNOWLEDGEMENTS

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), Cadw: Welsh Historic Monuments and Snowdonia National Park Authority. Further research and interpretation were undertaken by Margaret Dunn (who wrote the house history) and Richard Suggett. Some material was derived from Coflein (the online catalogue of archaeology, buildings, industrial and maritime heritage in Wales curated by the RCAHMW) at https://coflein.gov.uk/en/site/26396?term=Derwyn%20bach and from a report by the Gwynedd Archaeological Trust (1998) at http://www.walesher1974.org/her/groups/GAT/media/GAT_Reports/GATreport_297_compressed.pdf

Compiled by Martin Cherry May 2022.