

The *Buarthau* of North Wales – and beyond.

New field and remote sensing survey, a critique of earlier studies and how the Welsh archaeological industry fails our heritage.

John Rowlands, 2023.



Above: complex buarth captured in its wider landscape setting alongside Afon Llafar, Carnedd Dafydd and Carnedd Llewelyn in the background. NPRN24404, SH 64989 65365, 392m amsl. Drone image of July 07, 2023, 18:08UT.



Above: in active use - a buarth, including a large uphill 'paddock' area, at Bodesi, Dyffryn Ogwen. New NPRN 800212, assigned as a result of the present work, SH 67556 61121, 380m amsl. Image of 2023 October 12. Videos of this gathering seems to have prompted similar efforts shortly thereafter by the 'Corlannau' website.

Most texts – and they are very few – claim that multicellular sheepfolds are recorded only in a handful of countries: Wales, where they are known as *buarthau*, Iceland (*réttir*), Croatia (*mrgari*) and Switzerland (*färricha*) – all places with plenty of mountainous terrain. It seems to me that the very numerous occurrence in Jordan of ‘wheels’, the form of which strongly suggests multicellular sheep/goat folds, are rarely mentioned in this context. The same is true of South Africa, though cattle may have been the focus there (see below). It seems that, in time, closer examination of satellite imagery and further field work is likely to increase the number and distribution of such structures and their understanding.

Coming back home to north Wales, we find that very little formal research has been conducted on our pastoral landscape, including the *buarthau*; typically, only very general descriptions are given of them. This is very disappointing, as images posted to social media sites revealed an incredible level of public interest, as revealed by their sustained onward sharing. Whilst early mapping efforts in the mid-19th century carefully recorded the location and form of *buarthau*, early upland archaeological surveys, typically of the middle part of the 20th century, consciously decided to omit them from their work, which heavily focused, in a post-antiquarian, Anglo-romantic fashion, on house, church, castle and prehistoric sites. Their assumed age was said by RCAHMW (1956), under ‘Miscellaneous Notes’ within *Caernarvonshire Inventory, Vol. I (East)*, p. lxxvii, to “not justify an individual entry for each example”. Yet, like so many before and after them, the authors also accepted there being “no record of when they were built”.



Left: ‘Wheel’ structure examples in South Africa. Their resemblance to the multicellular sheepfolds of Wales (‘buarthau’) is notable and recent interpretation concludes they were containment and sorting pens for cattle.

Right: Icelandic sheepfolds most clearly reveal the core mechanism of all folds across the world: central gathering of some kind and sorting to the periphery. SE shore of Hafnavatn, SE Iceland (64.129163° , -21.650008° , 80m amsl). The resources of abundant loose rock and water are, as always, critical to the siting of most such folds. Image © Amg80/Flickr, contacted but not responded.



Left: ‘flower’ or ‘wheel’ style buarth at Gwaun Gynfi, due in 2023 for destruction to make way for slate quarrying. The archaeological planning service deemed it to be “not of national importance” and Gwynedd councillors unanimously approved its destruction. Analysis by optically-stimulated luminescence, for dating, has been suggested to Gwynedd Archaeological Trust; it remains to be seen whether the intended ‘mitigating’ studies will in fact take any heed.

Linked to NPRN 302989, SH 60896 63853, 369m amsl.



Left: a färrich in Belalp, Switzerland (46.380470° , 7.9865456°). The form is essentially identical to the buarthau of north Wales, but the periphery cells are distinctly more straight walled, though rounded walls are still present. The altitude is a high, 2143m amsl. Ski lifts run from very close by and are named after the fold. Image: gridreferencefinder.com

MISCELLANEOUS NOTES

LARGE SHEEPFOLDS

CHARACTERISTIC features of the Snowdon area are the large multicellular sheepfolds, which seem to be unusual elsewhere. Their age does not justify an individual entry for each example.

They show great variation in detail (Fig. 19), but are all essentially similar in principle.¹ A converging passage leads to a gate opening into a large central enclosure, off which low openings lead to a number of smaller compartments. From each of these a further opening usually leads to the outside of the fold, either directly or through other compartments. The central enclosure is sometimes double. Where a stream is near, provision is made for dipping. The walls are well built of massive dry-stone masonry, the low openings being spanned with large stone lintels.

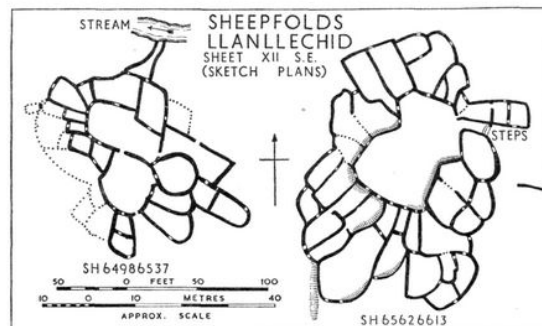


FIG. 19

They are used for sorting the sheep belonging to a number of farms which share a common sheepwalk. The flocks, on occasions such as shearing times, are driven into the central enclosure, and the individual sheep are then passed into the small cells, each of which is the property of a particular farm.

There seems to be no record of when they were built, but most of the existing examples are shown on the M.S. O.S. map of about 1810, and they are almost certainly to be associated with the great increase in sheep-farming which took place during the 18th century.²

Above: the sole reference to buarthau in *Caernarvonshire Inventory, Vol. I (East)*, p. lxxvii, RCHAMW, 1956.

Lost in language.

This failure to examine and appreciate the *buarthau* of Wales – a significant number of which, in 2023, remain unrecognised in the official record – allows them to be treated by the formal archaeological industry within Wales with a lack of respect and even dismissed as unworthy of recording. The reasons for these failures are many, complex and often subtle. They include rarely-highlighted attitudes considered by some to be distasteful or ‘taboo’. Welsh culture and history have long been seen by the imperial colonising power of England as inferior, irrelevant and something to be obliterated from the record and, as in examples such as the flooding of Capel Celyn in 1965, from the physical world. Even today, the school curriculum in Wales has little to say about our long history, strongly favouring the Anglo-Saxon narrative. Ignoring Welsh heritage, whilst loudly celebrating the English colonial castles of Edward I, is the best way to stamp-out any

notion of national pride within Wales – a part of the wider aim. For the most part, we would have to admit these efforts have been successful, at least for now. Such attitudes were pervasive across the British Empire, being instrumental as mechanisms of subjugation and control.

In 2023, the extension of Penrhyn slate quarry led to an assessment, according to formal guidelines, of the beautiful Gwyn Gynfi buarth as being “not of national importance”. We may well ask: are the rules simply designed to render Welsh heritage unimportant and is short-termism ever a proper justification for destroying heritage? We must also remember that, either through over-reliance on assessments like this and/or desperation in trying to bolster the very weak NW Wales economy, our local, fervently Welsh councillors unanimously voted to approve the quarry extension and the destruction of Gwyn Gynfi’s *buarth* and, indeed, far more ancient and, arguably, more valuable heritage over and next to which it was built. Gwynedd Archaeological Trust, who reached the assessment of non-importance were, to heavily paraphrase their Planning Officer’s response, ‘only following the rules’ (and did not comment further when invited, 13/10/2023). But do those rule sets fairly represent what the people of Wales would consider important? The answer is almost certainly not. But the people are rarely aware of, let alone involved in, decisions on their own heritage – something which the heritage and archaeology industry here seems perfectly content with, doubtless as it avoids any difficult questions or public backlash until it’s all too late.

Imperial attitudes can reasonably be argued as being alive in Wales today; the archaeological and historic environment industry here is dominated by those from an English background, a result of the academic nature of the subject, engendering a mobile, often transient and typically fairly young, middle-class workforce. The impact of ‘outsiders’ being the mediators of understanding, appreciation and protection of Welsh heritage is, I suspect, quite profound. This is not to say it is deliberate nor, of necessity, negative in the manner that unbridled English imperialism was as recently as the mid-20th century. Today, it is more likely to be inadvertent, a product of the cultural and educational environments one is brought up in and, in particular, appreciating Wales, but lacking much understanding of its language and culture, with such staff often unconvincingly – and rather tiringly – claiming they “do understand a bit of Welsh”.

The argument, controversial it may be for some, is strongly supported by evidence provided by this, alarming response (ATISN 18942), received 21/09/2023 from Cadw, as to the fraction of staff at Wales’ official heritage body who have *any* level of spoken Welsh ability:

Our response

1. 23.4% of Cadw staff, are considered Welsh speakers*.
2. As part of our acknowledgement letter, we advised:
Welsh Government does not hold this information. To obtain this information, you will need to contact RCAHMW directly: nmr.wales@rcahmw.gov.uk
3. 22.1% of Welsh Government staff, are considered Welsh speakers*.

*This is where staff have self-assessed their Welsh speaking ability at levels 3 (some work related), 4 (most work related) or 5 (fluent).

Fewer than a quarter of staff working in the *heritage advisory body for Welsh Government* having anything from level 3 to 5 ability is truly astonishing. Level 3 is not very able; it amounts only to understanding the thrust of a simple conversation and being able to give faltering responses. Given the data is based entirely on self-assessment, the true level of Welsh ability is almost certain to be significantly lower than presented.

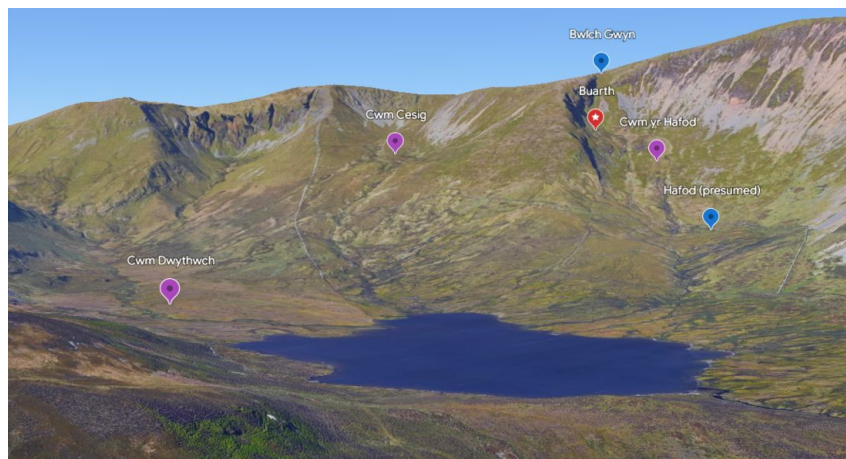
At RCAHMW, the situation (2022-2023 annual reporting period, FoIA response RC23-0468 of 26/9/2023) is better, but far from ideal, given nearly one half of its staff are assessed at being “below level 3” – that is, having no effective Welsh speaking ability.

The results showed that out of 34 staff in post at that time:

- 34 staff (100%) had some level of skill in Welsh;
- 19 staff (55%) had skills assessed as level 3 and above
- 15 staff (44%) had skills assessed at below level 3

These problems can be exacerbated when English survey companies are contracted to undertake work within Wales. For example, during the course of this work, the wider area around Cwm Dwythwch, within sight of the ceaselessly-busy path from Llanberis up Yr Wyddfa, yet little visited, came under examination. A prominent and relatively complex *buarth* – NPRN 505704 – is perched, high up a small subsidiary valley, overlooking – *but not in* – Cwm Dwythwch. The small valley is recorded on OS maps as Cwm yr Hafod and, as we would expect, at the lower reaches of this small valley, a *hafod* is found (if we accept the Royal Commission’s survey of 1960, drawing on records dating back to 1352 – *Caernarvonshire Inventory, Vol. II, 170*, p.164), recorded today as NPRN 505612 (SH 56318 57851)). This crucial relationship between the name of the small valley, the presence of a *buarth* and a *hafod* is clear to anyone who understands pastoral activity and the Welsh language. But it has *completely* escaped the surveyors, who wrongly recorded the *hafod* to be within Cwm Dwythwch, adding insult to this injury in naming the *buarth* in its relation to a small gap/pass (‘*bwlch*’) in the ridge above – Bwlch Gwyn – which quickly made its way into the official record. A lack of Welsh language and knowledge of the culture and area amongst English surveyors is a very significant problem that is serving, in too many cases, to erode and sometimes replace important Welsh placenames that invariably hold crucial historical information of this sort, wherever they arise.

Right: Cwm yr Hafod and the *buarth* above the asserted hafod building(s). English surveyors, as recently as 2006, entirely failed to recognise this crucial relationship between placename and structures, as they did not understand the language. 3D rendition: Google Earth.



One also comes to find the use of overly-technical terms, often seemingly deliberately deployed to create an insular culture of ‘office speak’, applied to simple structures. To upland farmers of Wales, *buarthau* were purely utilitarian. It is debatable whether such terms as ‘transhumance’, ‘rectilinear’ and so on are in fact appropriate or meaningful in Wales. *Buarthau* were just that; they were never then called ‘multicellular’, either in English (when few, if any farmers spoke that language here), or its Welsh equivalent and were, most likely, not distinguished from any other and simpler *buarthau*. We may find it easier to communicate ideas to a wider world with such language, but they have, more especially when considered against the historical narrative of English attitudes to Wales, a certain appropriating quality that serves to remove these structures from their cultural and even physical context, turning them into the curiosities of outside observers.

The following analysis is an academic critique of a specific work and none of the foregoing text is intended to, nor should be implied to be, applicable to the person of the author of that work, Ms. Fiona Johnson, now Dr. Fiona Grant of Cadw. Ms. Grant was given the opportunity to engage with questions about her work but was unable, partly due to reasons beyond her control, to do so in substance by the time progress with publishing my work had to be made. Ms. Grant will henceforth be referred to as Ms. Johnson, as *per* her published work.

Fiona Johnson's 1998 Dissertation.

One study that is cited, on the rare occasions when Welsh *buarthau* are under consideration, is that of Fiona Johnson, an undergraduate project dissertation of March 1998 for her studies at the University of Manchester – though the academic level at which this work was executed is rarely mentioned in the works that do cite it.

Ms. Johnson would probably not disagree with the general observation that undergraduate project studies are not required to be, nor are they usually, of the highest academic standards of research rigour; they are typically the first time a student will have conducted supervised, very limited-scope and poorly-resourced research, the practical field or laboratory work usually taking place over a few weeks during summer.

Johnson's project write-up, essentially a field recording exercise – later shown not to be especially accurate in some cases – and commentary on 35 sites in a limited geographical area, is cited by Gwynedd Archaeological Trust (*Report 1162. Medieval and Post-Medieval Agricultural Features in North-West Wales. Report on scheduling enhancement study, Part 1: Report and gazetteer.* J. Kenney, February 2014)) as “the only detailed work done on sheepfolds in the area”. Whilst true, it is also worrying because of the several obvious limitations of undergraduate project work in general, and of this project in particular. Johnson asserts (p.1) her work to be a “complete record of the multicellular folds”. If Johnson intended us to understand this as a claim that all multicellular *buarthau* to be found across north Wales had been recorded, it was a claim that would not stand up to scrutiny. Johnson's record was anything but complete, covering only a small fraction of those that existed in this selected north Wales area, let alone the very many beyond it.

Regrettably for Johnson, because her work has stood alone and is relied upon as a ‘standard text’ in the peer-reviewed literature quite so much, it becomes necessary to examine it very carefully, to reveal where weaknesses in current understanding of *buarthau* lie and where those studies may be perpetuating misunderstanding. This is the primary motivation for this critique.

That said, within the scope of such work and the resources available, Johnson did a good job on her project. In particular, she is generally careful to consider several different options for the development narrative of Welsh *buarthau*, which is often complex and difficult to elucidate.

Johnson did rely quite heavily on personal communications and the mere personal opinions conveyed therein, rather than peer-reviewed academic citations. In doing so, the impact of 'outsiders looking in' again (Johnson herself, as she confirmed in her right of reply, was not then a Welsh speaker (and remains of weaker ability in the language) and had to rely on translations (p.220, confirmed in a brief e-mail response of 02/20/2023)) comes into strong focus. Personal communication also leave us, at least in this case, with no record of what the basis for those expressed opinions, whether or not they were correct, in fact were.

The important question of who is undertaking archaeology within Wales is very rarely, if ever, openly discussed, but it needs to be. As the celebrated, if not entirely free of controversy Egyptian archaeologist, Zahi Hawass recently noted in a TV documentary:

“When I was a young man, I hated archaeology. When I [went] to any bookstore, all the books [were] written by foreign archaeologists. When I open[ed] the TV, I [saw] foreign archaeologists [in] all the interviews, never an Egyptian. And that also killed me. Foreigners were ruling...”

Unknown: the lost pyramid; Big Dreams Entertainment/Netflix, Max Solomon (director), 2022, 29':17" – 30':37" from start.

Hawass was not expressing xenophobic sentiments, but dismay that Egyptians themselves were not studying their own heritage, applying their local skills and understanding to the study of their local archaeology. Some would feel the same about Wales.

Ms. Johnson's lack of Welsh led her to make spurious comment, such as (p.165) that the term '*buarth*' has “the same historical connotations as '*cae*' [field] thus suggesting a homestead in the immediate vicinity”, though she noted there was no physical evidence for such a homestead in relation to her 'Site 020' (*Buarth*

Cwm Ithel) that prompted this idea. Bizarrely, the word ‘*cae*’ does not even appear in the naming of Buarth Cwm Ithel nor its surroundings, begging the question why Johnson embarked on this train of thought at all. This is not the only occasion within her text that Johnson jumps on to some supposedly exciting revelation without there being any reasonable evidence for it; she makes similarly-excited assertions about her ‘Site 031’ (NPRN 288176, SH 50135 50751).

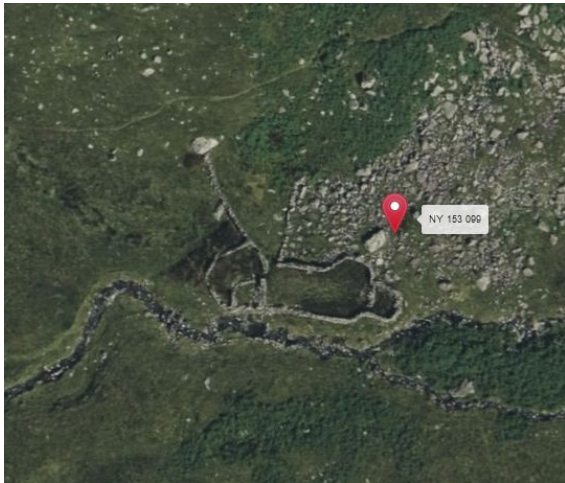
‘*Buarth*’ in fact means ‘yard’, i.e. a farmyard or courtyard, more specifically a smaller enclosure within the immediate area of a farm house, *excluding* the larger, more permanent enclosures of fields (*Cysgeir*, Bangor University, referencing *A Dictionary of Archaeological Terms in English and Welsh*; also *Geiriadur ar-lein Cymraeg-Saesneg, Prifysgol Cymru, Y Drindod Dewi Sant*). ‘*Buarth*’, then, seems to have been applied at some stage to all smaller enclosures – including the folds now under study – wherever they happened to be. The term ‘*corlan*’ is used in areas away from Eryri, though the distribution of this word’s use is not very clear. Use of ‘*corlan*’ will be readily understood by those where ‘*buarth*’ is normally used as referring to a fold, but use of ‘*buarth*’ may cause slight confusion where ‘*corlan*’ is the default term; the present author, being one of the *Moch Môn*, still tends to think of an enclosure within a farm’s yard when he hears ‘*buarth*’.

Because the farmyard was the *hendref* (or ‘*hendre*’, to which it is commonly shortened – meaning the farmstead)), this would be on the lower ground, whereas the *buarthau* (sheepfolds) would be somewhere in between it and the high pastures from which the sheep would be gathered. This did not preclude a *buarth* (usually with a different purpose) at the *hendref*, which would in fact be commonplace. In Iceland, folds are located differently, being much more commonly nearby the farm dwelling and buildings; several examples can be found in the long valley extending SSW from Akureyri and south of Hrafnagil, in the north of the island.

The only similarity between ‘*buarth*’ and ‘*cae*’, then, is that they both refer to enclosures, but ones that are demonstrably and clearly distinct; no native Welsh speaker expects to find the larger enclosure of a field when someone says ‘*buarth*’. Luckily, we do not, in fact, need to dwell on the precise development and meaning of the terms, because Johnson seems only to have realised this similarity at some point and then applied it to a structure where the term ‘*cae*’ simply did not exist. On Johnson’s logic, any structure with the name ‘*buarth*’ attached to it would indicate the presence of a homestead in the *immediate* vicinity, which is very clearly not the case for this nor most other *buarthau*, nor the basis of the pastoral system operated here, where the *hendref* was ordinarily distant from the *hafod and buarth*. The very fact of there being no fields (*caeau*) on the hills was the very reason sheepfolds (*buarthau*) were needed in the first place!

Ms. Johnson, in a brief response of 02/10/2023, stated that she could “not recall the reasons” for her comments on Buarth Cwm Ithel. This effectively rendered futile the asking of any further questions, the more than one month period for which had, in any case, lapsed by then.

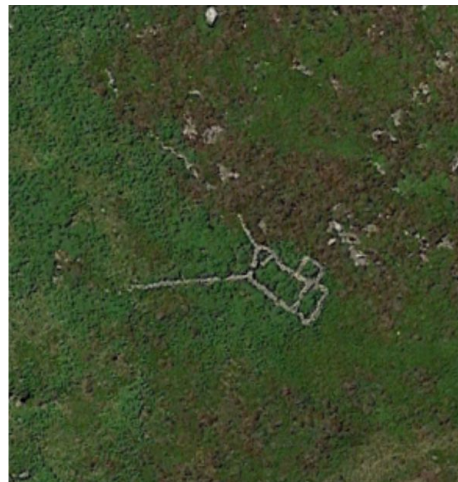
Claims by Johnson, arising from personal communications, that “multicellular folds closely resembling those [of north Wales] are not apparently known elsewhere in the British Isles”, are readily shown to be incorrect. There are many examples in Cumbria of folds that incorporate multiple sorting cells. The two examples shown below are both forms that are found in north Wales, and both are multicellular, if not of the most complex form seen here. Complexity, as Johnson notes, might, ultimately, be linked solely to the number of local farms who had flocks to gather; the more farms sharing land, the more cells would be needed. Highly complex folds are not the only nor most common forms in north Wales, most being similar to the Cumbrian examples shown. It is the *purpose* of the folds, rather than complexity *per se*, that is perhaps the best criterion with which to categorise them. In this, all but undivided folds can usually be said to have been for sorting of some kind, into flocks and/or, for example, into ‘unwashed’ and ‘washed and drying’ groups.



Left: Cumbrian divided sheepfold at NY 153099. Note the converging guiding/herding walls to the north. Whilst this is a different in appearance to the more complex multicellular folds seen in Wales, its function is nevertheless the same and its simplicity must simply reflect fewer common-grazing owners or smaller flocks in that vicinity; adding complexity was hardly beyond the ability of experienced drystone wallers of the area. As in over half of the north Wales examples, a stream lies very close at hand for washing, here almost certainly the principal function of the fold.



Left, above: Cumbrian fold at NY 13319 06070, (rotated for comparison of form)



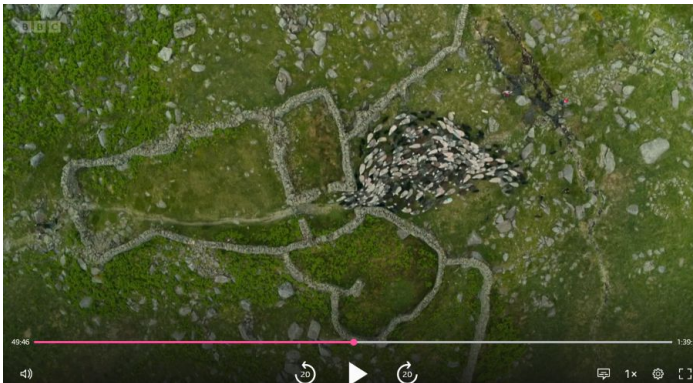
Above, very similar fold and guiding walls in Wales, at 351m amsl SH 51289 45110, 268m amsl. Not officially recorded by RCHAMW.

It was also possible to identify at least one true multicellular fold (right) in Scotland, in a form that uses circular and rectangular cells – both types of wall being in equally good and probably fairly recently-built condition, highlighting the potential pitfalls of association by Johnson of form with age – and her assertion that such folds are not known outside north Wales.



Above: complex multicellular fold, north of Dumfries, at NX 97331 97332, courtesy Graham Brooks, Solwaypast

A multicellular fold came to feature on the BBC's production, *The Great Sheep Gather*. Located beneath the western scree-laden flanks of Scafell Pike, alongside the River Esk. This less complex but nevertheless multicellular fold demonstrates again that this solution to sheep sorting is more widespread than Johnson indicated was the case. Note the location: intersection of rough, steep ground with flatter, lower ground, near a river and where stone was readily available as scree – all the criteria we find in north Wales.



Left: a four or possibly five-celled fold beneath Scafell Pike, Cumbria, showing herding walls in action. NY 21731 05172, altitude of 374m amsl. In this 2020 Windfall Films production for the BBC, the sheep were not sorted but merely passed on through to the lowland farm for shearing. Though simpler than the most complex forms seen in Wales, there was clearly no reason of ability or resources why folds such as this could not have been readily expanded, should that have been necessary. Still from 'The Great Sheep Gather' (2020), at 49'56" from the start of the programme. Extract under fair dealing, the production company notified 28/8/2023 and no objection received.

Out in the northwestern fringe of Scotland – on Hirta, the largest island of the 'St. Kilda' archipelago – the landscape there is littered with substantial and very well-preserved drystone sheepfolds ranging from simple single folds to various sizes of multicellular folds. Though the origins of the name 'Hirta' remains uncertain, at least two suggestions relating to shepherding (Norse: *hirt*, made by Tom Steel in *The Life and Death of St. Kilda*, Harper Collins, 1988 (pp.27, 28) though he interpreted the term to mean an island "rising from the sea", 'shepherding' the others in the archipelago) and herding (Norse: *Hirðö*, made by William Hutchison Murray, *The Hebrides*, Heinemann, 1966, p. 196, with elaboration at p. 236 have been made historically. Whilst Hirta was not included for some time in British mapping efforts, it was well mapped and visited by the time of Johnson's dissertation and the academics she corresponded with ought to have known of the folds there.

As we shall see later, concentrations of *buarthau* identical to the north Wales examples were identified during the present study in relation to higher ground in south Wales.

Johnson's claim that the currency of use of *buarthau* (by farmers) in north Wales can be determined by the presence of "sheep droppings or trampling" (p.154), are not especially reliable. Any casual observation of folds, notably obviously derelict examples (i.e. where walls are very badly ruined) will typically reveal sheep grazing and taking advantage of the considerable shelter and slight warmth afforded by even collapsed stone walls that is otherwise sparse in the upland landscape (so much so that short, isolated stone walls were widely built across the area to provide such shelter) – all of which usually – but not universally – produces plenty of droppings and, to various degrees, trampling that in no way involves farmers using the sheepfolds in an active manner that in any case only amounts to use once or twice a year.

A better, but by no means reliable guide to currency of use, is the degree to which cells of the fold are absent of thicker growths of bracken and the overall condition of the walls. The presence of more recent, often metal artefacts such as fences and sheeting is also a good indicator of recent active use.

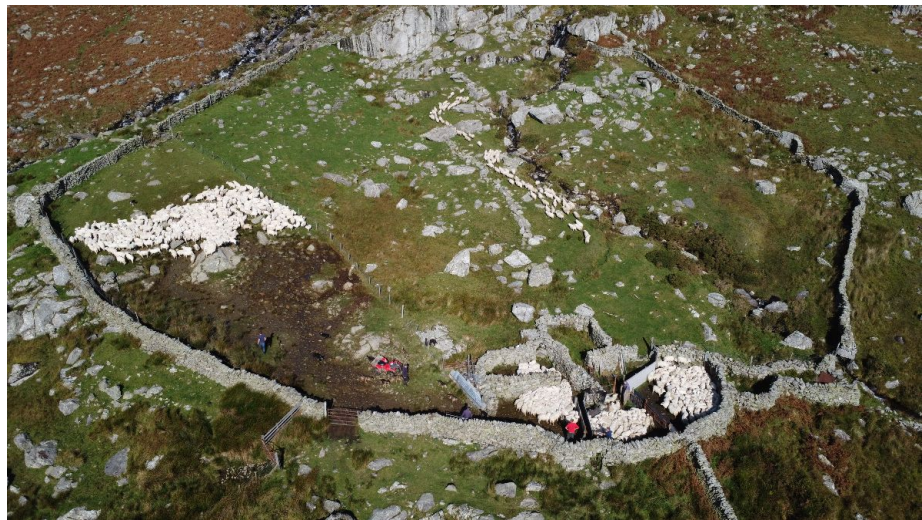
Hill farmers with family presences stretching back many generations in Cwm Pennant, consulted during informal conversation in the outdoors during this work, were clear that *buarthau* in that area "are no longer used". The story in Dyffryn Ogwen is very different, where a few folds can readily be seen in action during the annual gather. Assertions in distinctly Anglocentric texts such as Harvey (*The Industrial Archaeology of Farming in England and Wales*, 1980, p.145), which drew on views from an earlier, 1959 text (*History of British Animal Husbandry, 1700-1900*; Trow-Smith,

pp. 8-9) that all *buarthau* are “long derelict” were, and remain, as Johnson earlier noted (p. 154), definitively and demonstrably incorrect.



Left: complex buarth at Gyrn, NPRN 401619, SH 64827 68876, 509m amsl, which remains in regular service. Note that there is very little other than short grass growing in most of the cells. Additions, likely in the 19th century, are seen in ‘crawiau’-based (slate and wire) fencing. Modern wire fencing is also present but difficult to see on the lower right of the shot.

Right: Buarth at Bodesi, Dyffryn Ogwen, new NPRN 800212 assigned as a result of the present work, SH 67553 61123, 380m amsl, witnessed by the author in very dynamic use, during the autumn gather of 2023. Sorting takes place from the left gathering pen into the uphill paddock, other cells, and out to the open lower ground at lower centre right via a ‘creep’ hole. Slate ‘crawiau’ (fences) and later, wire fencing, metal sheet and gates are all used to supplement the drystone enclosures and sorting. The cell to right of the shepherd in red top is paved with stone slab. Drone image of 2023 October 13, 11:05UT. Two videos of the operation can be found at:



<https://youtu.be/f8bGWh8OYM>
<https://youtu.be/s4xAYe7ef2c>

Johnson also pondered (p.156) in her assertion – and it is not given as a tendency but much more as a universal feature – that where folds are built up to and incorporate rocky faces, “the central enclosure occupies a level area” and then goes on to say that, given the lack of necessity for a level surface for sheep processing, that a rather mysterious and wholly undefined “previous use” may be suggested by such level ground. Whilst it is, of course, possible and even likely that some folds may have made use of previously level (or levelled) ground, any suggestion that this is universally or even usually so is readily disproven, as the several examples below, with absolutely no indication of any levelling or use of anything other than the natural, modestly sloping ground, show.

It should be incidentally noted that the current official RCAHMW record for NPRN 505838, created by Oxford Archaeology North in 2007, asserts the fold is both “large” and “amorphous”. The size, relative to its complexity, is fairly typical but substantially smaller than the largest folds to be found – one of which, covering some 3.5 acres – lies on a slope of Yr Wyddfa, nearby. The “amorphous” term was used by OA North repeatedly in relation to structures that were self-evidently, as in this case, *not* amorphous. I have previously criticised – and OA North have accepted – very significant failings during their examination, for example, of the Marconi ‘Carnarvon’ trans-oceanic wireless station at Cefn Du – a site that, it should be well-noted, is only a century old and where fuller understanding by archive and field work was readily possible. OA North did not respond to an invitation to comment on this *buarth*’s description.

Right: small multicellular fold at Maesgwm, near Llanberis (NPRN 505838, at SH 57733 56589), built up against a rock outcrop, but with no attempt at levelling the ground surface. 356m amsl.



Left: a simple, probably four-cell fold incorporating a rocky outcrop showing no sign whatsoever of levelling. A survey by Latham (2013), rather astonishingly, claims it is built on a “slightly more level part” of this steep hill. The qualification ‘slightly’ was never more apt, but Johnson’s claim of ‘levelling’ where outcrops are incorporated is again and rather dramatically disproven. NPRN 418848 at SH 64145 63362; lowest point of walling at 376m amsl, highest at 398m amsl – a rise of 22m.

Right: a complex buarth at Clogwyn yr Eryr, incorporating two low rocky outcrop areas, again showing no sign of levelling nor, on the face of it, any earlier structure in immediate association with it. Bizarrely described as both ‘remains’ and ‘intact’ by the same 2003 survey. NPRN 276287, SH 72602 66676, 426m amsl.



Left: complex buarth between Afon Garreg Wen and Afon Ddu, again described as ‘remains’, though clearly in good condition, actively used and extended by modern materials. Its incorporation of a rocky outcrop makes use of relatively level ground, but there is no particular evidence for any levelling, nor of an earlier structure. NPRN 276280, SH 71289 67479, 525m amsl.

Right: Buarth at Cwm Dwythwch, evidently long disused, internally overgrown and in a poor state of repair, incorporating a rocky outcrop for its 'back wall', yet clearly showing no levelling or signs of earlier structures. Much of the fold makes use of a shallow stream valley with naturally fairly level ground. NPRN 505812 (relating principally to the barn-type structure at foreground, with no comment upon the detail of the fold), SH 56943 57196, central fold 301m amsl.



Left: Buarth near Afon Bwlch Goleuni, also incorporating a rocky outcrop and showing no levelling or earlier structure. NPRN 533532, SH 69801 59008, 293m amsl.

An important claim made by Ms. Johnson is in relation to the narrative of the sheepfolds' designs. Whilst modification through addition and, probably less often, subtraction is likely to have occurred at some folds, the claim by Johnson that 'irregularity' is in any way an indicator of cells having been "added to" an earlier, simpler structure is not supported by any reliable evidence. Indeed, Johnson did not define what she meant by this subjective term. From other passages in her text, it seems to have meant 'symmetry'. Given that folds do not show any particular attempt at symmetry, other than that loosely forced by their function of sorting sheep from a typically central gathering area, 'regularity' and 'irregularity' are unlikely to be useful terms, certainly in relation to age. Shape and size may or may not have changed across time at any given site – and we have no reliable clock by which yet to measure the passage of sheepfold time, as we shall see later.

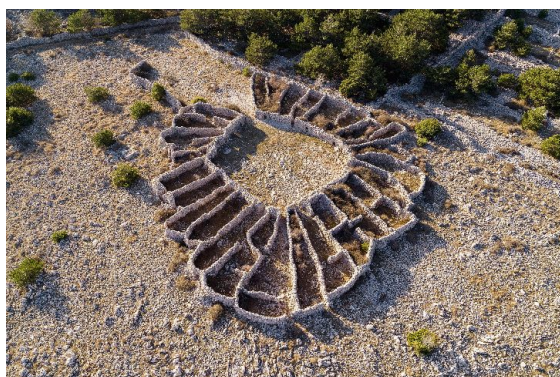
Similarly, Johnson gives rather dramatic weight to a sentence, appearing very early on (third sentence, p.9), two years earlier, in *Snowdonia from the Air: Patterns in the Landscape* (Crew and Musson, Snowdonia National Park Authority, 1996) that is manifestly taken out of context. The claim that "the dominant shape of prehistory is undoubtedly the circle" is subjective and contestable and does not necessarily apply, nor was the sentence intended to apply, to all geographic areas in all contexts. Crew and Musson were writing these words in relation to Neolithic to Iron Age period structures, and did not intend to suggest circular structures never occurred later. Crew and Musson, as Johnson notes, mention sheepfolds only twice, both times very much in passing, within the whole book. By page 40, moving on to the post-Roman period – and still centuries to a millennium or so before, we can reasonably assume, any of the *buarthau* were built – the authors are clear that the predominant shape then had already become "rectangular". Christopher A. Smith (1977), citing Stanford (1974), stated that "sub-rectangular" structures in Britain were once believed to indicate a Romano-British date – until rectangular structures dating to the "late prehistoric period" were discovered and the idea became immediately invalid (*Enclosed Homesteads in North-West Wales: An Interpretation of their Morphology*, Archaeologia Cambrensis, Vol. 126, pp 38-52). Knowing this, it is surprising that Crew and Musson made their claim, and that Johnson repeated it. To suggest that the degree of 'roundness' in any given fold is indicative of much greater antiquity, as Johnson does, might yet be proven true. But until the dating studies are done and the evidence produced and scrutinised, we do not know whether this assumption is reasonable nor, indeed, what degree of 'roundness' might apply. Unfortunately, these studies are remarkably slow in being conducted within Wales – although the physical evidence present in the *buarth* above 'Ogwen Bank' in Nant Ffrancon, an example with plenty of curved features, clearly

indicates this structure to be no more than, broadly, 200 years old – although an outer, possibly herding wall might well be significantly older; further work is needed for that specific element.

It is not long before a further examination of the folds reveals that many, if not most, contain rounded walls appearing alongside very straight walls, with no obvious case to make that these reflect earlier or later periods of construction or modification. In Croatia, where folds are often identical in their range of forms to those of north Wales, none there, regardless of form, have been dated beyond *ca.* 170 years according to Kale 2012, cited in the English-language paper: *Multicellular sheepfolds (Mrgari) as monumental shepherds' dry stone wall architecture: a Cres-Lošinj archipelago case study*; Stud. Ethnol. Croat., vol. 33, str. 243–274; Kremenčić, 2021.



Left: buarth on the western slopes above Aberwgyngregyn valley. Do we call this circular in form, or rectilinear? Croatian 'mrgari' of this sort are identified as 'flowers', which is a far better, generic descriptor that does not force a needlessly strict linear/circular label. Another useful descriptor might be 'wheel'. The inclusion of an apparently modern, intact and seemingly non-repaired wall within the main body of the structure suggests, in any event, that it is not an especially old structure. Not previously formally recorded, now allocated NPRN 800158 as a result of the present work, 325m amsl. SH 65797 70969.



Above: two examples of Croatian mrgari that are essentially indistinguishable from north Wales' folds, even down to the inter-cellular, lintelled 'creep' holes. The example on the right shows a linear wall and a twin-celled enclosure, which are also seen widely in north Wales. The similarity for such widely-separated geographical areas is striking, highlighting that such sorting structures arise naturally from the underlying need and that there is only a limited way in which this need can be satisfied: gather in the middle (usually) and sort out to the periphery.

Altogether, we can question whether there are any real differences between folds, such that some can confidently be said to be 'round' and others 'rectangular'. The answer seems to be: not particularly. RCAHMW, in their 1956 report (op.cit., p. lxxvii) were of the same opinion, stating the simple truth that *buarthau* showed "great variation in detail but are all essentially similar in principle". We need not make the situation more complex. There are a couple of examples of especially rectangular folds, but they are very few and invariably include rounded walls somewhere. 'Rectangularity', in at least one case, seems to have been a product of the limitations of location and may also reflect the type of stone available, some freeze-fractured blocks allowing more rectangular forms whereas glacial rocks might demand the use of more difficult stone and, thus, rounded forms. Rounded walls are widely understood as leading to less panic in recently-enclosed sheep, so they are expected to – and do – occur widely.



Left: perhaps the most 'rectangular' (and of the highest elevation) of all the known stone-built folds. The central and upper cells as seen in the photo lie on a long, narrow (15m wide) platform. The lower cells slope markedly uphill. The form thus seems to have at least been partly dictated by the suitable available land that yielded the necessary working cell sizes. The precise kind of rock available also seems to play a part. Even so, the fourth small cell at top is seen to be distinctly rounded in part and was noted as such by Johnson. Foel Lwyd, NPRN 278680, SH 71609 69037, 618m amsl.

In fairness to Johnson, there is at least one site – NPRN 93571 (below) – that dramatically shows a progression from circular to rectangular form over what is probably several centuries or more – though this site did not feature in her study, given that it is not a multicellular *buarth*. The problem here is that it is not clear what the purpose or age of the earlier oval was; it may have been a sheepfold, or it may have been the enclosure for a small settlement; again, no work has been carried out for us to know and it is simply labelled by RCAHMW as 'prehistoric', with no further evidence or interpretation. So it remains, for now, as a case of an earlier structure in a convenient place and with a ready supply of stones, that changes shape over time. It is far (ca. 700m) from any running or standing source of water, and the rectangle clearly had no complex sorting function of the kind performed by multicellular folds.



Left: NPRN 93571, Foel Dduarth, SH 68003 71745, 306m amsl

Johnson, however, doesn't help her argument in assigning the term 'wheel', which may be a useful descriptor, to a structure – her 'Site 006' (SH64156430, Afon Berthen) – that is, self-evidently, not remotely wheel shaped!

Right: Johnson's 'Site 006', NPRN 4188850, described by her as a 'wheel' form. This was either an unclear definition of what a wheel form looks like, or an error in the write-up. It is perhaps best not to use a classification system beyond whether a fold is single or multicellular, simple or complex, near water or not. Anything else just serves to muddy the waters. 419m amsl.



In further evidence for my challenge concerning regularity, by reference to Johnson's 'Site 004' (Afon Garreg Wen, NPRN 276632, SH 71432 67684, 515m amsl), as captured in summer 2023, below, I contend that the central, gathering enclosure is carefully positioned in relation to, and some distance from the stream running alongside, which is a very common association because it afforded gathering, washing and, it is often claimed, drying facilities for the sheep.



If the cells to the south, closer to the river, were later additions, they would be expected to exhibit compressed dimensions, relative to the general structure. The effect would be to introduce asymmetry to the overall plan. There is no compelling evidence that this is so, regardless of where along the perimeter we look. The general impression is one of a central enclosure positioned with the peripheral cells arranged more-or-less symmetrically and having been anticipated as part of the completed structure from the outset. Any apparent asymmetry and difference in cell

shapes/sizes is invariably explained by ground slope, difference in anticipated flock sizes and specific use (e.g. isolation for a small number of injured animals, etc.)

Consideration of similarly-complex folds, such as the Cwm Caseg (East) (Cwm Wen) fold (Johnson's 'Site 029' – NPRN 416712) also situated in close relation to a stream, shows again the symmetry and overall dimensional uniformity of the peripheral cells, which show no tendency towards compression in any direction. This fold has, incidentally, been modified with the addition of a metal sheet fence since Johnson's work and, it appears, a later, 2012 official survey, where it was also not depicted, demonstrating recent use. One of the most *asymmetric* folds known in north Wales is that nestling right up against the freeze-fractured scree summit of Gyrn, above Bethesda, a wide-open plateau that afforded unlimited possibilities, had these been wanted, for a highly-symmetric structure.



Left: *Gyrn sheepfold (NPRN 401619, SH 64827 68876, 509m amsl). Where complete symmetry was possible, the most asymmetric fold was in fact built. The arrangement of the gathering area and central pens is highly-planned in relation to the overall structure. The gathering wall (far left) is of the same length as the outermost cells, which are very deliberately set, suggesting a single-period construction. The channel-like pens to the SW (top of image) are clearly of a specialised nature and are seen elsewhere.*

Also against the claim of addition to and occasional subtraction to the folds is the well tied-in nature of the walls where such modification is suggested or asserted; this would not be seen, or seen to be interrupted, where modification had occurred.



Left: *is this a 'regular' or 'irregular' fold? Do the terms really have any meaning in relation to these structures, when they all had much the same purpose and that purpose is readily clear to the human eye? This is, however, certainly amongst the most unusual fold forms of all. Moel yr Wden, Trawsfynydd area; NPRN 309146, SH 76519 35270, 391m amsl.*

Thus, whilst additions to the folds can reasonably be expected, due to their purpose and readily-modified dry stone wall nature, to have occurred from time to time at some locations, "irregularity" of the folds – which is

itself a highly subjective term, ought to be either properly defined and assessed (which it was not by Johnson) or dismissed as an unnecessary modern imposition on folds that neither required nor sought any particular regularity.

Right: a concluding image on the topic of form and ‘regularity’ is this small (15m width, L to R) fold at Bwlch y Bi. Two of the three curiously pointed cells have entire walls, the third either never had an internal wall or was removed or lost over time. It is an unique form amongst all the multicellular folds thus far examined, with certain parallels to desert kite head pits. NPRN 530854, SH 77567 35079, 448m amsl.



Orientation

Ms. Johnson plots the ‘aspect’ for each of her modest sample of the total true multicellular folds spread across north Wales; her figure 8.3 appears on p.158 and is reproduced (below, left), alongside my own assessment of each fold’s ‘aspect’ – the direction in which its main slope faces – and using a higher resolution for direction.

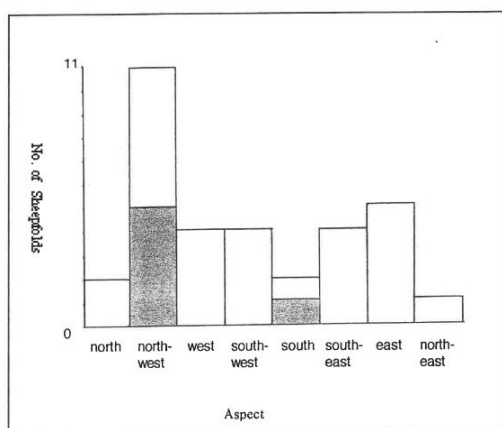
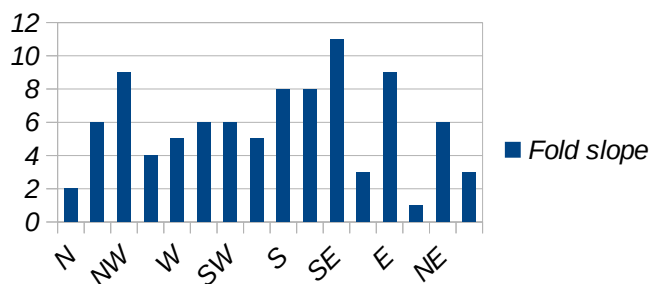


Fig. 8.3 Aspect Distribution of the Multicellular Folds.
Folds Shaded Represent Those Lying on Known Earlier Sites



Left: Johnson’s fold ‘aspect’ results based on 32 folds.

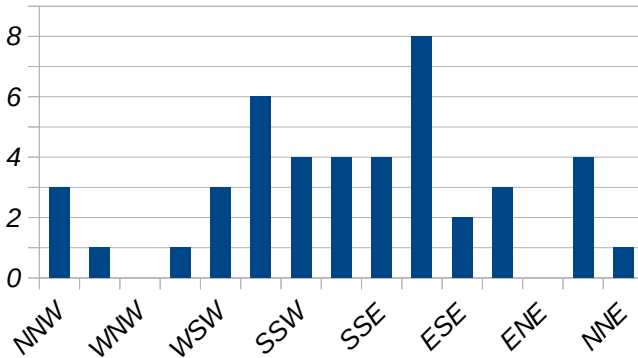
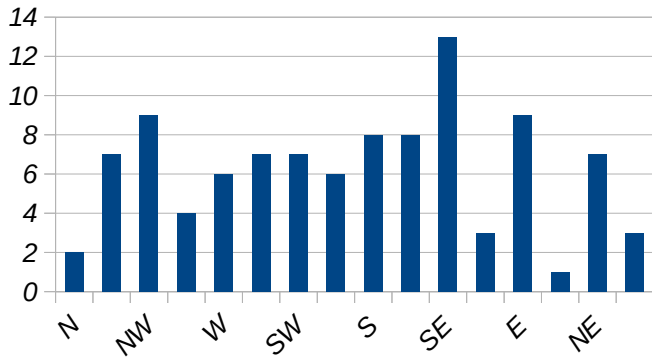
Above: this study’s results on 101 folds.

The difficulty is that Johnson again fails to define precisely what she meant by ‘aspect’ and it cannot reliably be assumed. She may have meant the direction of the main fold’s slope, as I have used. Or she may have meant what direction the downhill slope a valley in which any given fold was located faced. I chose the direction of main fold slope because this is the true direction in which the fold is facing, is more consistent – though not perfect – and, for those lying close to streams, the slope direction is usually aligned towards the stream. This is preferable to the slope of the landscape – typically a valley – because the fold can face an entirely different direction to that valley, but is typically at loosely right angles to it.

Eryri is a narrow mountain range (~30km for the higher peaks where folds would be generally necessary) with a relatively long (~60km) and well-defined SW-NE lengthwise alignment, with the main body of glacial flow cutting at essentially 90 degrees across this lengthwise alignment. It is therefore necessary to – though Johnson did not expressly – take this into account in determining whether there is a ‘favoured’ aspect, as Johnson suggested from her sample of 35 from at least 148 multicellular folds I have identified – a number that continues to grow with increasingly-careful analysis of remote imagery (analysis presented here is on an earlier total in this study of 101).

Right: plot of direction of main fold slope (i.e. the direction of dominant 'tilt' of the fold) for all 101 identified folds across north Wales. One fold straddled a low ridge and had multiple tilt directions, and is thus excluded.

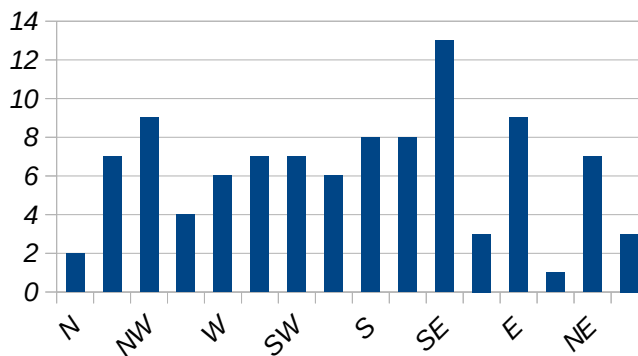
This result is substantially different from that given by Johnson, who used less than a third as many folds in her analysis.



Left: plot of direction of dominant fold slope for those folds north of a line down the Nant Ffrancon - Ogwen valleys and extended eastwards, broadly forming the 'Carneddau' group.

Again, Johnson's results are substantially at odds with this analysis, indicating she used a different definition of 'aspect'

n=44

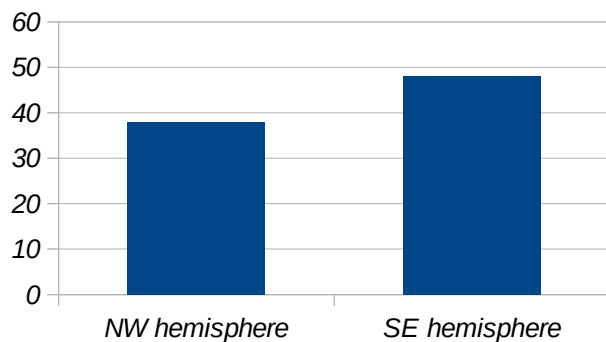
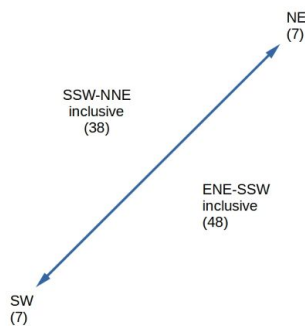


Left: Plot of main fold slope for those folds south of the Nant Ffrancon - Ogwen valleys and extended eastwards, broadly forming a 'non-Carneddau' group.

n = 56

(one fold had multiple slope directions, and is excluded)

Splitting 'aspect' into two hemispheres either side of the Eryri long-axis alignment of SW-NE and calling the SW-NE half 'western' and the NE-SW half 'eastern', we find there are 38 folds in the western part, and 48 in the eastern. 7 folds have a NE-facing aspect, 7 have a SW-facing aspect and are excluded from the second plot.



Plots, in two formats, of folds falling within two hemispheres either side of a SW-NE line, being the long axis of the Eryri range (SW and NE point data (both n=7) and one fold with more than one aspect are thus omitted). n=86

These results show that, contrary to Johnson's conclusions, there are 26.3% more folds facing the 'southeast' than there are facing the 'northwest', which strongly correlates with the side of the uplands upon which they are located. Overall, there is no evident 'preferred direction', although it is perhaps not surprising to find more folds on the eastern side, given this is a more sheltered aspect in relation to the SW-dominant weather and sees the sun much earlier in the day. Johnson's association of 'part-time' sheep farming alongside the primary occupation of slate quarrying, whilst it could be correct, is shown to be unnecessary in terms of where folds are in fact found (there was no significant slate quarrying on the eastern side of the Carneddau). The idea that the "preferred" (but now seen to be absent) orientation "possibly" suggests an earlier preferred aspect for "a certain type of [unspecified] prehistoric structure" (p.158) is now rendered as invalid as it was then speculative.

Folds were clearly, then, built not with any particular *aspect* in mind, but with respect to a *position* that satisfied the criteria of where they were convenient in relation to the higher ground from which sheep were to be gathered, the location of farmsteads that used them, the supply of stone and, where relevant, washing water.

Fold-Finding?

Predicting the location of 'undiscovered' sheepfolds – noting that such structures are always fully recognised by those who work or otherwise know the land – seems straightforward. In just over a half (55%) of the initial 101 examined cases, *buarthau* are discovered by following the course of streams flowing down from high ground. The availability of stone was also a crucial factor; few folds are to be found where there is no loose rock, scree or similar accumulations, or earlier use of the same. This stands to reason; resources were scarce in what was then, to ordinary people, a remote place, but noting it was, from the late 18th century, simultaneously a region firmly connected, most obviously but not solely through the slate industry, to a very much wider world.

The advent of high-resolution global satellite imagery since just after the turn of the 21st century (*Google Earth* became available, generally with very poor resolution outside urban centres, in 2001) means that trying to predict sites from certain expectations is now all but entirely outdated; we need only look carefully and methodically at upland areas to see what turns up – though it should be noted that the most widely-used resource – *Google Earth* – presently has far lower resolution for Wales than, for example, imagery presented by *gridreferencefinder.com*. The analysis of altitude shows us we should usually focus our attention on, roughly, below the 500m amsl level, though outliers must not be excluded by an overly-strict application of this loose rule.

Johnson, however, was looking for evidence that *buarthau* predicted more ancient structures, not only *in association* with their sites, but directly *underneath* them. The null hypothesis approach – that there is no such superimposition – would have been a better and indeed required approach. Instead, Johnson tends to suggest or even find superimposition when there is little or no demonstrable evidence for it. Certainly, the criteria of "cell shape" finds no matching evidence when sketches are compared with modern vertical imagery that reveals errors, sometimes serious, in plotting. This is not to say that field plotting was then easy!

'Fossilisation'

Johnson considers the specific case for fossilisation – a term that is in general use but of dubious value – that is, the creation of new structures based on similar or identical but earlier structures in the same place. The term strongly suggests a *permanent* 'fixing' of stone in the more recent structure. A more negative interpretation of the term might be that it suggests a lack of original thought on the part of later hill farmers and/or a lack of respect for such earlier structures. Regardless, dry stone walls are inherently easy to rearrange when needed, and any suggestion of permanence is misplaced for *buarthau*, not least because, even today, modification using stone remains a possibility for active folds, though modern materials are easier to work with and tend, therefore, to be used instead.

In any event, Johnson again cites Crew and Musson (op. cit., p.9) in her obtaining of the term 'fossilise'. Consulting that text, we find it appears on the same, early page that Johnson finds her citation in relation to

circularity being some form of indicator of antiquity. Given that the text only refers to sheepfolds twice, this is perhaps not surprising but does appear to represent over-reliance on a few general comments at the outset of the Crew and Musson book, not least as the term ‘fossilise’ also appears only a couple of times in the whole text. Even then, those authors used the term in relation to field boundaries and not sheepfolds or other structures. Field boundaries would tend, by their very purpose, to have a settled and respected narrative of defining ownership or control – aspects that would strongly impose continuity and, thus, ‘fossilisation’. *Buarthau* would not generally have such an important, ‘legal’ purpose.

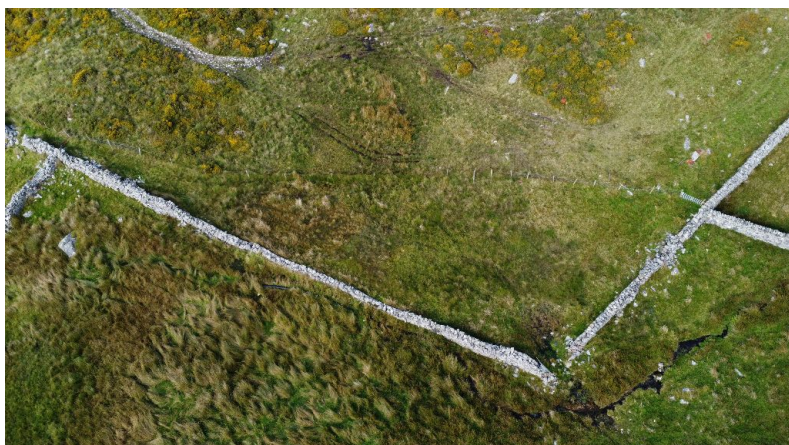
Far better, I would suggest, that the ‘fossilise’ term be abandoned altogether, and replaced, where it is shown by evidence to be appropriate, with ‘preserve’, ‘follow’ or ‘re-use’. Unlike Johnson, and based on field visits to many more sites than in that study, I find no compelling nor indeed any evidence for the overwhelming majority of *buarthau* that suggests they directly trace-out earlier structures underlying them.

Accepting that the internet and global satellite imagery were far less, if at all available in the mid-1990s, Johnson identifies a “quarter circle shaped” footing of “a structure”, though she does not speculate on the nature of the claimed structure. Drone imagery taken during the present critique clearly shows that the $\frac{1}{4}$ circle is in fact not of this shape and is seen to be an elongated, curved part of what was possibly an earlier wall line or, alternatively but perhaps far less likely, a narrow sheep pen built alongside the main wall, such as are seen sometimes across north Wales and beyond. It is not clear what Johnson was getting at with this claim. But her text does, in more than one place, tend towards suggesting something as-yet undiscovered despite there being scant or no evidence for it.

For example, and whilst changes in vegetation cover since Johnson’s fieldwork may have rendered some detail less obvious a quarter of a century later, her suggestion (p.160) that there is a “tantalising possibility” of an earlier structure beneath her site 031 (NPRN 288176, SH 50135 50750) seems not to be evidenced by any identifiable features – as her own text admits just a few sentences earlier. Given this lack of evidence, Johnson expands her views to claim nearby features, including a mysterious and, to my mind, absent “cell reduced to footings beyond wall B” seems to be a case of clutching at very poor straws.

We can only now conclude that there is no evidence whatsoever for an earlier structure here and that structures nearby do not seem to exist in the manner put forward.

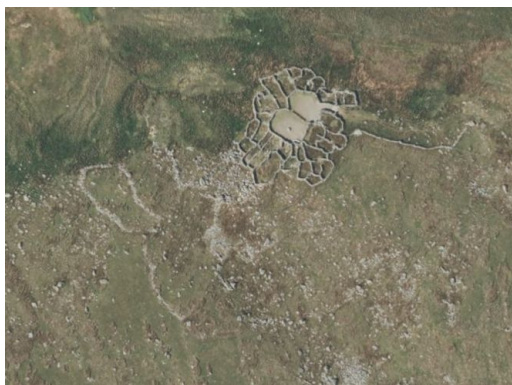
Right: a wide view of Johnson’s site 031, NPRN 288176. There is no indication of an earlier structure, the scattering of stones to lower centre of image being merely ice-deposited material such as is very widespread in this general area. 299m amsl.



Left: the curve that was identified as being of “ $\frac{1}{4}$ circle shape” by Johnson. The line of the old wall at the left hand side does not join the line of the more recent wall, but instead forms a narrow, parallel line with it. A visit on foot and with a drone clearly shows this is a wire fenced region which funnelled sheep from areas on the left to a pen formed by the fence and walling. Johnson’s claim of there being wall foundation stones here may have been a case of misidentifying random glacial stones. SH 50005 50902, near Cwm Silyn and immediately NW of her site 031.

In discussing her 'Site 030' (Cwm Caseg, SH 65620 66136, NPRN 24405), Johnson acknowledged (p.161) that there was "limited" information (we can assume she meant 'evidence') on an "enclosure system underlying" it, but progresses to claim a "striking similarity between certain cells of the fold and a sketch of some of the early enclosures...both being globular[-]jended structures with tapering stems". Johnson suggests this may reflect another "fossilisation of the earlier features".

Johnson does not clarify that the "earlier features" and "a sketch" of the same to which she refers lie just a few metres away from the multicellular fold that is her 'Site 030'. Whilst there is clearly *some* relationship between the two structures, the *nature* of that relationship is not clear. Firstly, it is possible the relationship is purely coincidental, perhaps, as for very many *buarthau*, prompted by a convenient, sheltered site. Secondly, the relationship may have been based on access to material – reuse of readily available and sorted stone. Thirdly, 'fossilisation' is certainly possible and the interface between the earlier walls and later *buarth* could be – it is by no means certain – a partial preservation of some of that earlier structure. But there is no particular evidence at the moment for any part of the earlier structure underlying the substantial part of the fold and we may thus expand Johnson's acknowledgement of "limited" information on this to there being 'no information', at least until someone does the work to find out – an ongoing and troubling difficulty within the professional heritage and archaeology industry within Wales in relation to these structures. Examining a satellite image of Site 030 and surrounds, it is clear that Johnson is correct to highlight the similarity between the earlier, presumably fold remnant at centre left and the pointed cell at the SW position of the later fold (cell 'A' - see later overlay, below). Oddly, however, her mapping of this specific cell is substantially in error and one has to wonder how the (correct) comparison of similarity between old and new structures was reached.



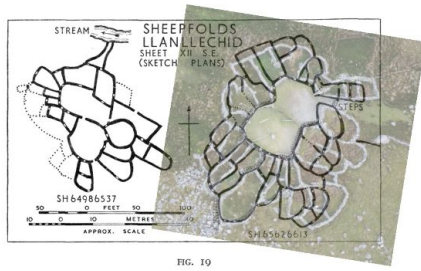
Left: wider satellite view of the area around Johnson's 'Site 030'. The structures at centre left are likely much older than the *buarth* at top right.



Looking in detail at Johnson's claim in relation to similarity of form between "certain cells" and the earlier structure, we see that the similarity would appear to be based on one cell (cell 'A' in my overlay, **left**). The overall attempt at plotting the site is quite good. But it is not perfect, as the overlay demonstrates; there are significant errors in the shape and extent of several cells in her drawing of 'Site 030' – including the critical cell 'A'. Johnson's drawing overlay has been rotated to match my summer 2023 vertical drone image purely for my practical reasons; Johnson's plot was correctly orientated, whereas my drone image was taken with defeating strong winds and not geographic orientation much in mind. Image field distortion is considered negligible, though ground slope may introduce minor distortion to the photos. Cell 'A' (as built and not drawn) has a pointed outer end which arises in many folds, both simple and complex, across north Wales and is also seen in

Croatia. Given it arises so often, and is distinct from the shapes of the other cells, it is presumed to have a specific purpose or that building of outer projecting walls of this sort is rendered easier by this shape. Discussion with Ogwen sheep farmers during gathering in late summer 2023 did not shed any light on this

apparent design feature, other than to say that some did not believe it had a particular function, whilst others were unsure. Wider discussion may or may not change this conclusion.



Johnson was in good company in her somewhat inaccurate depiction: the 1956 RCHAMW Inventory (op.cit., p. lxxvii) makes much the same errors (left). Comparing the 1956 mapping with 1840-1880 OS mapping reveals that a wall has been removed or lost from the lower entrance cell in that period. But foreshortening of the eastern plan remains. The fold at left of the RCAHMW plan is in a separate location and should be disregarded.

Finally, turning to Johnson's 'Site 032' (NPRN 287906), we find the following assertion at p.163:

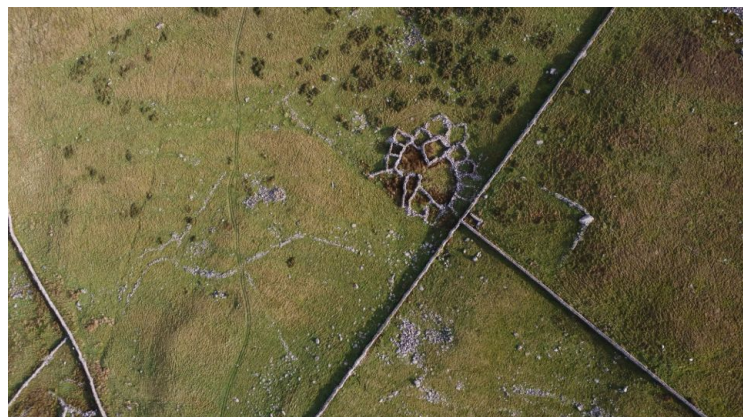
"The almost circular cells and extremely well-built walls of the northern part of the fold invite comparison with hut-circle remains found elsewhere...it seems highly probable that this site is built over a prehistoric settlement".

Re-examination of the fold using modern satellite and drone imagery (13/09/2023) throws the assertion of the fold cells being "almost circular" into complete disarray: none of the cells are remotely as circular as Johnson depicts in her sketch. Indeed, there are significant failings that contribute to what is, ultimately, a poor representation of the buarth. The grid 'north' indicator is wildly incorrect, being some 35 degrees east of grid north; not even possible confusion between magnetic and grid north can explain this error.



Left: Johnson's 'Site 032', NPRN 287906, SH 55116 45415, 339m amsl, in a September 2023 drone image. The overlaid 1998 sketch is significantly in error and the cells claimed to be "nearly circular" are not. The buarth is, as Johnson says, close to an earlier stone structure and doubtless used stone from it. Evidence for direct superimposition is weak, but cannot be ruled out. The cells nearest the straight field wall are mostly reduced to foundations, whereas those further away are mostly intact; this may be due to robbing of the buarth's stone for the wall. Johnson's incorrect north arrow is in black, correct grid north in yellow – a difference of some 35 degrees. The lower field wall demonstrates very low image distortion and is considered negligible for this purpose.

Right: wider view of Johnson's 'Site 032', clearly showing traces of mediaeval or earlier stone structures alongside, though much of this, but not the buarth, is on slightly raised ground at centre left, which may have sought to avoid a wet area. There is no compelling evidence of direct superimposition ('fossilisation') at the buarth's location and its form is not suggestive of tracing any earlier, underlying form. One edge of the buarth (lower left in this image) terminates where the slightly higher ground rises in front of it, which part of the earlier stonework also responded to.



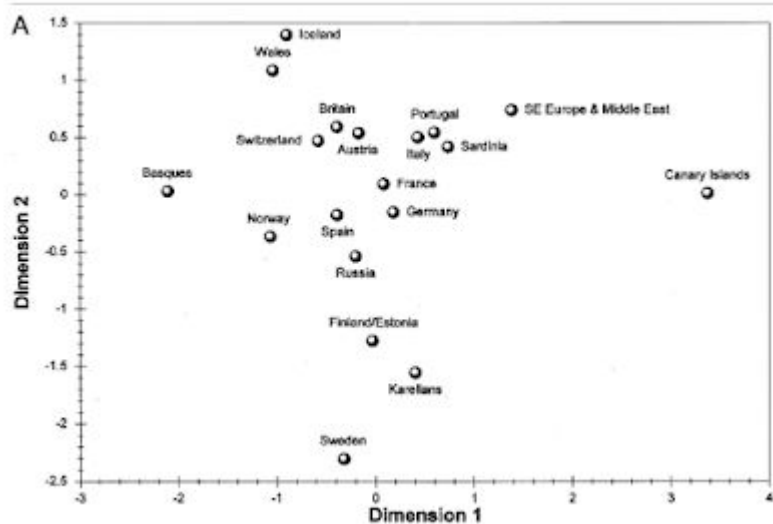
There is even a case to be made that earlier stone structures, whilst convenient for stone supply, might have been actively *avoided* for direct overbuilding or 'fossilisation'. A site (SH 54909 45950, 338m amsl – see image, below), 550m to the NW of Johnson's 'Site 032', shows simple, single-celled pens with a herding wall, of near-identical form and orientation, but where the seemingly more recent pen has been built anew, 18m to the NW, possibly using stone from the older. As for much of this, Cwmystradllyn general area, earlier stone wall traces are evident in wider aerial views, all around the two pens. It is possible that building anew, rather than over an existing structure, was easier for the wallers, or that parallel operation of earlier and later folds took place for some time, or that respect for earlier structures was practised.



Left: two, similar single-celled folds lie close to one another, the rightmost seemingly of greater antiquity than the left, with herding walls and a modern era field boundary wall at Ceunant y Ddol, Cwmystradllyn area. The higher ground immediately above this site hosts an extensive, concentric-pattern mediaeval or older field system. NPRN 287930 (left buarth), NPRN 287891 (right buarth), centred at SH 54909 45950, 338m amsl.

Skills Transfer?

An interesting link made by Johnson, between Icelandic and Welsh sheepfolds, is that of the settlement pattern of Iceland, which is given by her as "believed to have been made up of a strong Irish element", citing a 1987 study, considerably predating modern DNA sequencing techniques and analysis. Whilst the Irish did indeed feed into Iceland's population, the closest and strongest links are now known (e.g. *mtDNA and the Origin of the Icelanders: Deciphering Signals of Recent Population History*; Helgason et al, March 2000), to be with Wales. Johnson's insight that population links brought the topic of multicellular sheepfolds within both countries "closer to home" was therefore generally correct but possibly much more so than was known to her, or anybody else at the time.



Plot of 'closeness of relations' between populations of modern nations with Icelanders by Helgason et al, 2000.

Attempts to elicit a more recent opinion about Welsh input to the early Icelandic population proved fruitless and so an updated view on this aspect cannot be presented for the time being.

Altitude.

Johnson also ventures, in a very limited way involving 35 sites, to plot the altitude (her fig. 8.2) of sheepfolds examined in her study, the result of which is given at left.

Today, it is far easier to find and measure the altitude of multicellular sheepfolds through satellite imagery than it was back in 1998. I update Johnson's work by plotting a total of 84 true multicellular folds, which runs from southern Eryri on the left to northern Eryri on the right; a slight increase in typical height with increasing terrain height might be suggested but has not yet been analysed. Since the plot was made, a modest number of other folds have been identified, but are not included.

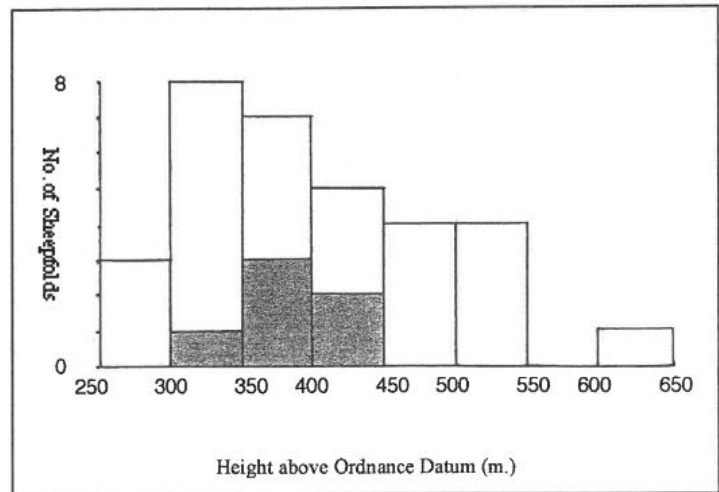
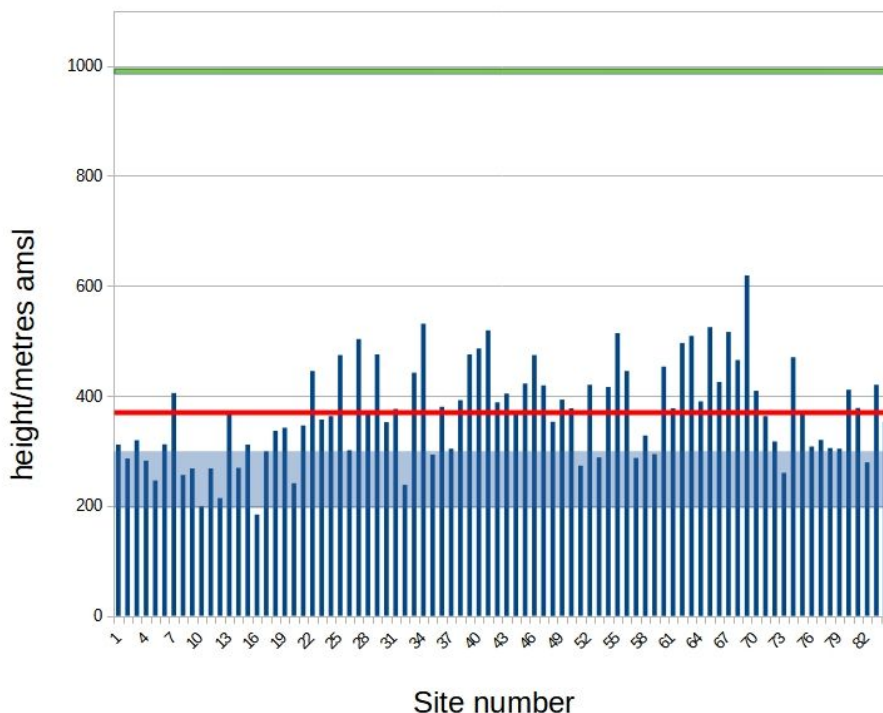


Fig. 8.2 Altitudinal Distribution of the Multicellular Folds. Folds Shaded Represent Those Lying on Known Earlier Sites



Heights (blue bars) for 84 multicellular sheepfolds.

Orange = average fold elevation.

Green = mean Carneddau range elevation.

Horizontal blue box = typical elevation range for hendrefi (farms).

The mean height, though of rather suspect utility, is 370m amsl, with a fairly low standard deviation of 88.7m. The highest peak of Eryri, Yr Wyddfa, reaches 1085m amsl. Taking the average of the 15 highest peaks of Eryri as a better measure at 982m amsl, the mean sheepfold height is thus seen to be one third this maximum height, or 37% of the average of the 15 peaks. Given the purpose of sheepfolds in gathering sheep off higher ground at a point convenient to the farmers' hendrefi, this is not a surprising result. Of course, the farmhouse – the *hendref* – was never located at sea level and so the above plot must take this into account; a typical hendref in the central Carneddau would typically lie at 200-300m amsl. Sheepfolds were therefore, in most cases and as we would expect, considerably closer, at least in height if not in horizontal distance, to the farmhouse than the highest ground.

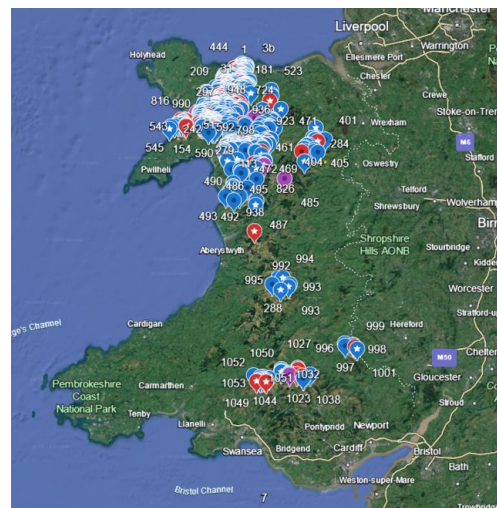
It must be noted, however, that we are already into territory that over-complicates the reality of how sheepfold sites were chosen; no upland sheep farmer ever had access to a barometer or GPS. Instead, the general criteria for siting folds were (a) a point in valleys where the steepest slopes of the highest ground meet much gentler ground at those slopes' feet and (b) access to a ready source of walling stone, either scree or from an already-existing structure or set of structures. In other words, a point mid-way between the farm and highest ground. In 55% of 80 examined multicellular folds, a stream (or, rarely, a lake) lies in close or immediate proximity, reflecting those folds' use for both sorting and washing.

Johnson also ventures to say (p. 151), that there “is an almost complete domination of siting within the Carneddau”, based on her total sample size of 35 multicellular folds. The total number of true and relatively complex multicellular folds across north Wales is *much* higher – 102 are already identified in my 2023 mapping and this total is still growing across Wales and, indeed, the wider UK – and Johnson’s conclusions about the dominance of the Carneddau is therefore entirely incorrect.

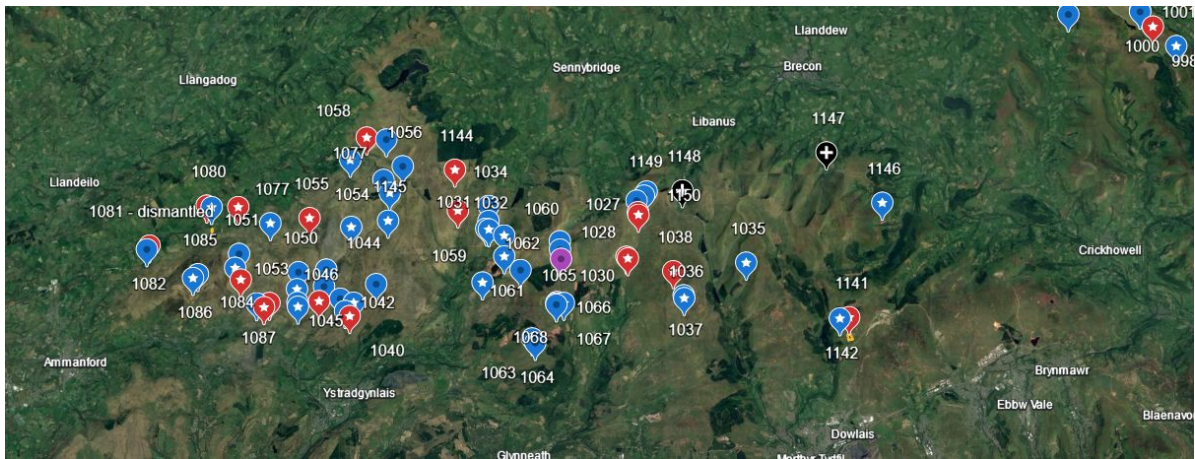
The Carneddau range can be taken to be all areas north of the Ogwen/Ffrancon valleys and up into the southern edge of the Conwy valley. Within that area of some 60km², approximately 43 true multicellular folds are found (0.72/km²). To the south of this area, at least 64 true multicellular folds are found, the total likely to be somewhat greater.

Whilst Johnson did not have access to satellite imagery, making her work considerably more difficult than it is today, the concentration of at least eight complex multicellular folds in an elevated area of some 8.2km² (0.98/km²) near Llanaelhaearn, for example, has always been well-known and its absence from Johnson’s study is therefore difficult to understand, except perhaps for her lack of local knowledge and/or inability to travel very far to study them – a not uncommon problem for undergraduate projects.

Right: identified multicellular *buarthau* (red) and simpler pastoral enclosure features (blue) identified across Wales as of 28/09/2023, with more certain to be identified later. The concentration of true multicellular folds in north Wales is largely masked in this wide view by other enclosures. True drystone *buarthau* are seen to occur in a concentration within the Bannau Brycheiniog area, thus disproving earlier claims by Johnson and others that such folds were not known outside north Wales. As noted in the main text, multicellular folds were identified in Cumbria and Scotland and it is likely many more will be found with effort focused on this area. Base map: Google Earth.



Similarly, there is a concentration of *buarthau*, some showing unique design features, within the high ground areas of Garndolbenmaen and Cwm Prysor that do not feature in Johnson’s work, again apparently as she did not cast her net that far. In the Cwm Pennant/Cwmystradllyn wider area, some 19 complex folds, with many more, simpler examples, lie within an area just under 20km² (0.95/km²). The present work then moved on to examine south Wales by satellite imagery. Here, a significant concentration of *buarthau*, many drystone, others of modern materials, were identified across Bannau Brycheiniog (‘Brecon Beacons’). Early OS mapping reveals that several *buarthau* have since been completely erased from the landscape of this area. In central Wales, post-WW2 afforestation has completely obscured if not destroyed numerous *buarthau* that were recorded on earlier mapping though they sometimes reappear weakly when logging takes place. In Scotland, some folds were lost, though re-emerge during droughts, in the post-war era during the process of extending lochs to serve as reservoirs. Similar drowning also occurred in Wales (e.g. Llyn Cwmystradllyn). Back in south Wales, at least one complex, drystone *buarth* was identified only 4.5km from the border with England, near the appropriately-named Capel y Ffin (‘Chapel of the Border’). The border with England has always been closely associated with the transition from high to lower ground, meaning that folds are few within the Marches, although they occur again with the onset of high ground elsewhere in England, as we have seen.



Above: the occurrence of true complex buarthau (red) across Bannau Brycheiniog, with simpler folds in blue. More are very likely to be identified with closer examination of better-resolution imagery. The long-held claim by Johnson and others that complex buarthau closely resembling (in this case, identical to) those of north Wales is definitively shown to be false.

The occurrence of complex *buarthau* in proximity to the coal heartlands of south Wales might suggest a transfer of pastoral practices from the slate quarrying centres of the north – in that direction, rather than the alternative, as coal tended to offer better reward to workers than slate. Against this suggestion is the fact that mass movement of workers from north Wales centred on the *Streic Fawr* (Penrhyn Great Strike) in the opening years of the 20th century, which is likely too late for new *buarth* construction in the south, though it is likely that, with slate having been industrially developed somewhat earlier, in the 1770s, than the south Wales coalfield, workers from the north passed south from the early 1800s onwards. *Buarthau* were also identified as far east as the southern Clwydian Hills range.

Johnson’s conclusions about distribution, orientation and supposed ‘style’ were therefore fundamentally skewed by a survey that did not include the majority of true multicellular folds of Eryri due to the very limited area examined. The correct and simple picture is that *buarthau* are correlated with the higher mountain elevations with upland common grazing land, wherever in north (or most of) Wales it is present. As the landscape becomes less truly mountainous, so the complex folds disappear; the ‘transhumance’ simply not being needed there.

Johnson then claims a “dominance” of a north-westerly “aspect” – presumably she meant ‘facing’ or ‘located on’ for the multicellular folds. Again, this suffers from far too limited a sample size and a certain lack of consideration for where the farm homestead (the *hendre*) were located and, thus, where *buarthau* were needed. A fairly dense degree of settlement took place on the western side of the Carneddau, which is by far the simplest explanation for this particular “aspect”. On the eastern flanks of the same mountain range, any claim in relation to a “north-westerly aspect”, let alone a dominance of such, is immediately sunk. Whilst Johnson does identify outliers to her claim, her inadequate sample size meant that she incorrectly explained them away as unusual exceptions to her rule. The ‘aspect’ of the *buarthau* was, for the overwhelming part, simply a function of where they were needed in relation to the farmhouse.

Similarly, the conclusions about ‘style’ are weak. Style was not defined by Johnson, in the same manner that ‘irregularity’ was not. A multicellular sheepfold ought principally to be defined by *function*, and less so by *form*. This approach was highlighted by Smith, 1977 (op.cit., p.49) when, despite his work being centred on attempted classification of homesteads, admirably commented that:

“like so many artifacts, the homesteads were not built to a rigid pattern of classes but reflect rather the adaptive capability of a strong vernacular tradition”.

With *buarthau*, if there is an enclosure with more than one cell, then it is automatically a multicellular sheepfold. Beyond this straightforward degree of complexity, the precise form that such folds take is essentially simply a product of need: the more commons-grazing landowners using the same general area, the more complex the form becomes. *Buarthau* need not necessarily be made of stone; later additions to older *buarthau*, or even complete modern *buarthau*, are often in metal fence or sheet materials. This is most dramatically exemplified by the modern *rétt* of Iceland.

Problems also occur in relation to Johnson's identification of three folds with "paddocks attached" (p.159). Yet again, the small sample size misdirects her conclusions, as does a failure to consider the wider farming landscape of the area. Very many more folds have larger enclosed areas associated with them. Indeed, one can see in some cases, e.g. NPRN 402477, the Derlwyn *buarth* on the NW slopes of yr Wyddfa, that large areas of walled enclosures construct a system that, whilst not of the compact form of multicellular folds generally under discussion here, nevertheless amount to a clear system of containing, directing and sorting sheep. This has clear resonances with, for example, the wide area walling and gathering kites seen in Jordan and elsewhere; they were all part of a wider scheme of husbandry, though modern studies tend to treat kites in isolation from their wider environment.

Right: there can be no doubt that this is a true, if unusual multicellular *buarth*. Lying to the SE of Llanberis and cutting – though hardly anyone realises it – across the most popular route up Yr Wyddfa, it is much more expansive than most, and could be said to have "paddocks attached" as per Johnson. In terms of purpose, is there any real distinction between them? NPRN 402477, core area SH 58684 58573, 374m amsl.



On the question of Dating.

The opening words of Ms. Johnson's dissertation are: "The 18th century multicellular sheepfolds of the uplands of north west Snowdonia..."

Yet, the dating of north Wales sheepfolds, as Ms. Johnson admits later on (pp.31, 33), has not been investigated. Such dates as are estimated are based upon linking them – with no physical evidence in support – to the development of enclosed lands in the modern era, typically from around the 18th century onwards which is, we must assume, why Johnson provided this dating. It may not be an unreasonable assumption, but we do need evidence, and that evidence is currently absent.



It is true that, amongst the *buarth* population, there are straight, wholly-intact folds that sometimes look as though they were built very recently. Items left in the folds, such as gates and other barriers, can date from mid-late 19th century, but these offer little by way of reliable dating indications, not least as we can see that contemporary materials continue to be added to *buarthau* today, very long after they were built. Some walls *look* much more ancient in that they may be partly or wholly ruined, or built in a much less accomplished manner. But it is incredibly difficult, bordering on impossible, to

accurately date stone wall structures like this. Johnson asserts (p.153) that the more 'rectilinear' folds are in a better condition than rounder forms. But we have several examples of rectilinear folds – which Johnson implies are younger – but in very poor condition and some which are reduced to quite rapidly-vanishing ghosts in the landscape (e.g. that SE of Gyrn Ddu, SH 40815 45970, shown above, currently with no NPRN and only noted as an outline, with no 'sheepfold' label, on the earliest OS maps. Johnson's 'Site 031' is also in no better shape than many, less rectilinear folds.

Johnson highlights (p.31) a "possible prehistoric" sheepfold at Ffridd Bod y Fuddau (associated with NPRN 303057), drawing again on the Crew and Musson text (op.cit., p.23). But referring to the (MA project

fieldwork) study by York Archaeology Trust (another English survey company), which later came to examine this structure (*Uplands Archaeology Initiative; Project 2012-2013: Cwm Prysor Survey Area. Landscape Survey Report; Report Number 2013/8*, April 2013), we find that there is enormous uncertainty about this somewhat complex site. Without any excavation or other work, the potential date range spans the Iron Age to post-Mediaeval. The York study does correctly note, in relation to the possible *buarth*, that it was “shown on the 1889 OS map and may therefore be of a later date”. One can only point to the recognition by Ms. Johnson, which perhaps ought to have guided her work much more, that “no fold in the study area has been officially dated”, and highlighting belief about dates. Belief, of course, has no particular basis in evidence.

On the other hand, we have folds that are in extremely isolated places, rarely, if ever visited by walkers or farmers today, that are long-abandoned and have become obviously very derelict, seemingly only by the passage of a substantial period of time rather than any disturbance or damage by humans or animals. Such damage is the combination of freeze-thaw (weather) assisted rock movements and disturbance by sheep using the fold remains for shelter.

In respect of a long historical narrative, Johnson and others would have been better served by examining not the Carneddau range, but the mountainous terrain near Llanaelhaearn, notably that of Pen y Gaer. This prominent, single peak hosts, as its name indicates, an Iron Age hill fort, the walls of which are, in part, very well preserved. On the western flank, along the 320m contour but falling slightly to the south, the outline of a complex *buarth* is readily perceived from aerial views, but far less so from the ground, where the initial ‘feel’ is one of natural outcrops with some evidence of walling.

Right: relatively poor complex *buarth* remains, but its western elements seemingly ‘fossilised’ by more recent walling, which undulates in a manner that is not exercised anywhere else along this ~760m-long wall that runs along the ~320m contour around roughly two-thirds of Pen y Gaer. At upper centre far left is a likely uphill element, which may possibly predate the main *buarth* structure. NPRN 401154, SH 42717 45475, ~320-315m amsl. Drone image of 23/09/2023.



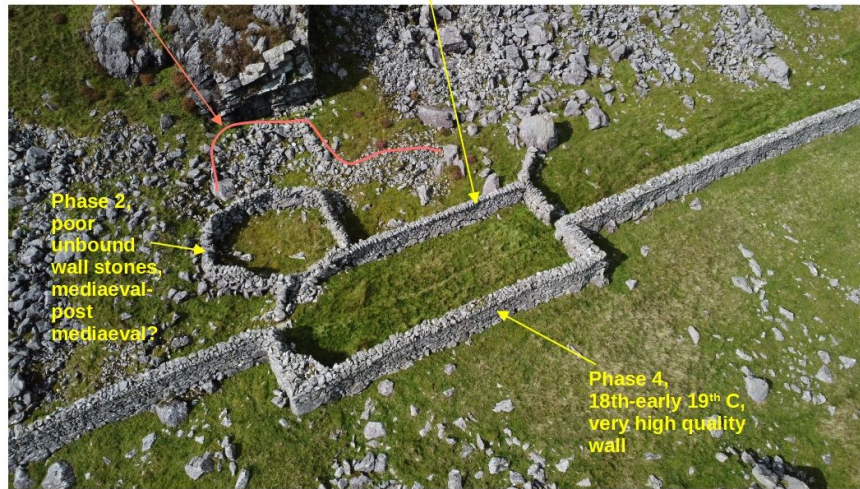
The strongly undulating, almost certainly more recent, high and substantial drystone wall seems to preserve the original outline of the western, outermost walls of a *buarth* of at least four cells, with clear suggestions of built structure uphill, at the northern extremity. None of the cell walls are keyed into the field wall. Undulations in the wall to the south might suggest additional, now lost cells of a once-larger *buarth*. Whilst robbing from the *buarth* to build the wall may, as the existing RCAHMW interpretation ponders, have occurred, it is not certain, not least as there remains today a good supply of stone around the site. In addition, the preservation of the *buarth*'s western outline may have simply been a quicker way to build the wall at this point, or it may have sought to maintain the *buarth* in operation, where robbing would have been self-defeating; further work on it may clarify. It seems almost certain that the *buarth* is significantly older than the wall, perhaps early mediaeval or earlier. More undulating walls tend to be a feature of earlier efforts and a clear example of this is seen on the SSE flank of the same peak, running up from the continuation of much the same contour to the hill fort walling at the summit plateau, some 20m higher up. But, again, the lack of funded, directed research to properly determine dates is, irritatingly, simply not there. Note also that this is another example of a *buarth* built up against the hillside that very clearly shows no evidence for ground levelling that Johnson implied was often or always the case.

Along loosely the same contour, but on the eastern flank of Pen y Gaer lies a superficially modern, rectangular and, thus, less interesting fold. But the presence of a near-circular cell on the SW corner attracts further examination, and a field visit was undertaken on 29/09/2023. This revealed what may well be three phases of fold development, as my tentative interpretation of the site shows, below.

Phase 1, mostly ruined prehistoric or early mediaeval? Cliff has recessed shelter and natural water supply

Phase 3, high quality wall, different topping style to Ph.4, with slight curve inwards at circular cell interface. Predating phase 4?

Pen y Gaer, SH 42992 45508
341m amsl. NPRN being assigned.



Right: tentative attempt at interpreting the stone evidence on the east flank of Pen y Gaer. Image of 23/09/2023.

Optically stimulated luminescence is a developing technique now making inroads into understanding the age of dry stone wall structures across the world. The method is, however, not trivial and depends on many assumptions that may or may not ultimately prove realistic. Studies in the Italian Alps (2022) provided very variable results on pastoral stone-built drystone wall (but not enclosure) features, with a loose tendency to suggest an early mediaeval period, noting that the history of enclosure there may be different from that which occurred within Wales. The Crew and Musson text (op. cit., p42) favoured by Johnson does suggest that north Wales' dry stone walls are likely to be much older than generally believed at the time. They are also very clear to say, on more than one occasion, that so little work has been undertaken on north Wales' settlement and field structures that it is "rarely possible to date them accurately" (p.6, p.42). A wide range of dates from the same structure, suggesting re-use of rocks in the Alps, were also obtained and this is seen to be very likely in some north Wales cases as well.



Above: outlines of settlement/pastoral structures on the steep slopes of Cwm Caseg are commonly said to be 'post-mediaeval' in date – though nobody has applied proper dating to support this assumption and others may judge them to be 'prehistoric'. Described as 'wandering walls', they are hardly aimlessly wandering as the widely-used term suggests, having clearly-defined, deliberate form and function. Rounded corners remained a feature of later and possibly much later multicellular sheepfolds, which may be a tradition carried forwards through time. The 1956 assessment (by RCAHMW) of this feature is more reliable than the 2008 version, where that organisation's latest aerial surveyor cites text published in "Snowdonia from the Air", a RCAHMW book of 1996, which makes all manner of unsupported assumptions, including that there could not have been proper walls here due to their low and sparse form today, seemingly not recognising how quickly stone can find itself being recycled elsewhere or being dispersed by rain and ice. The multicellular sheepfold at centre right, still in use and using modern gates, can reasonably be assumed to be much later and to have re-used the earlier stone. Personal communication with accomplished north Wales dry stone waller, Mr. Sean Adcock, suggested that the curved walls may have been built in this way because no special shape of rock is required for curves, whereas specific shapes are required for jointed, angled walls. Mr. Adcock also provided an alternative explanation in that the shape would have led sheep fairly gently around the walls, rather than suddenly panicking on meeting a sharp corner – something that was noted by Ms. Johnson in her dissertation.

Late in the summer of 2023, a fold site was visited – one of the more easily accessible on foot – on the opposite side of Nant Ffrancon, opposite the Penrhyn old quarry. It is present, though in a somewhat different, simpler form, on the OS Six Inch series of the 1840s-1880s and variously absent or present, with a possibly inaccurate rendition being perpetuated into the modern day – where its rendition is reduced to a simple label and no form at all on the latest OS 1:25,000 series.



Left: small multicellular fold near Ogwen Bank, Bethesda. This was not studied by Johnson, despite being readily accessible. The large boulder with iron rods is located at upper right, where a creep hole is visible in this drone image of August 30, 2023. This fold is similar in size and, especially, in the presence of 'pointed' small cells, to that seen at Bwlch y Bi, near Trawsfynydd.

(below) – a considerable distance at a time when communication between those areas would have been infrequent. This may suggest a spontaneous, identical solution to a common aim.



Despite these inaccuracies in mapping, the fold contains crucially-important and rare physical evidence for the period of construction. The most important evidence came about due to the use of a large glacial boulder in the walling, also forming part of a portal or 'creep' hole for sheep to pass out of the fold, once sorted. Part of the boulder has a pronounced, flat slope such that stones placed on top had to be kept from sliding off by the use of two stout iron bars fixed into holes drilled into the boulder.



Above: Iron bar and (upper) a somewhat shaped bar – possibly some form of rail (needs further examination) – inserted into a large boulder with a sloping face to prevent slippage of stone above. Such bars and the manner of their use can be seen widely within the Penrhyn and all other slate quarries and mines of north Wales. This strongly suggests a date not earlier than the late 18th century, with an early-mid 19th century date being considered likely. The shaped bar may allow a better narrowing of dates.

The bars are typical of those often found fast in tunnel walls within the Penrhyn old quarry and, given the immediate proximity (~900m) of that quarry to the fold, it is very likely the bars were sourced there. The quarry came into industrial scale production in 1801 and major drainage and transport tunnelling work took place between ca. 1848-1851, where iron bars can still be seen in the walls. The degree of spalling of one of the rods in the fold is similar in degree to those which have spalled within the quarry tunnels, and a similar date would seem likely, though the environment of each, both almost always wet, is different – not least in the usual absence of ice formation within tunnels. There is also a hooked-head bar within one of the cell walls, which might have been there from the outset, as it seems to support the stone above by filling a gap too wide to be left without packing, though this can only be considered weak evidence. On the outside of the walls there is an old iron bed head typical of mid-late Victorian era (1837-1901), though it could have been and probably was (it would have to serve as a bed for a long time first!) placed there as a gate or fence element at a later point. All this suggests, particularly the two supporting iron bars, a date no earlier than around 1800, and no later than around 1900.

Left: iron ring fixture installed into the easternmost walling of the fold overlooking Penrhyn slate quarry. It could have been emplaced at any time after construction, but the overall impression, especially in relation to the retaining iron bars nearby, its corrosion state and to the overlying stone, is one of having been present at the time of the fold's construction.



In the same week, to complete my survey, I visited the buarth at Garnedd Wen/Craig Celynin (NPRN 400519, SH 74819 73658, 320m amsl – Johnson's site 014). Lying alongside a well-used footpath, this is a well-known and much-photographed example and Johnson gave a good description of it in her dissertation. She did not, however, notice two prominent steel rods – one of which is clearly a component from a vehicle – possibly a gearbox input shaft – that have been inserted into the ground on one side of a 'creep' hole portal and which were almost certainly in place during Johnson's visit in 1997. Both rods seem to be primarily intended to contain a poorly shaped stone from slipping, with the gearbox component possibly propping up stones, which do not appear to be keyed into the adjoining cell stonework, above; it is not yet clear and needs further inspection. The second rod is clearly seen not to be propping up any rocks, but is, as mentioned, retaining a stone. As the cell is present on mapping from the 1840-1880 period, it cannot be younger than the latter date.

Right: two iron bars, one a steel gearbox component, retaining an awkwardly-shaped stone forming part of the side of a creep hole at Craig Celynin. The flat rock immediately above the nearest bar seems strongly to be propped-up by it, but further examination is required. The other bar does not prop but does retain. This cell is present in the earliest available OS maps (1840s-1880s (below)) Six Inch editions, when we may otherwise have been tempted to place a 20th century date upon it. That said, much closer examination is required to determine the narrative and dates, and whether the components now in place replaced earlier iron retainers.

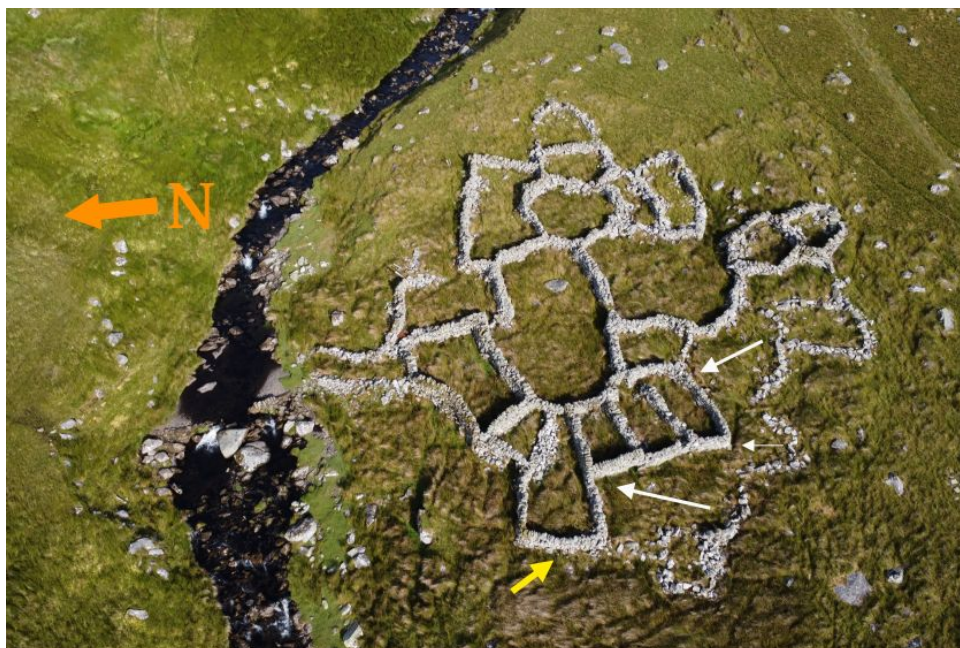


The only other clue to the age of some *buarthau* could be that provided by the small number of currently-known placenames on the earliest (1840s-1880s) OS maps that include *buarth* or its regional variant, – *corlan*. Examples are: ‘Buarthau’, a placename that was clearly inspired, presumably considerably before those maps were made, by the presence of complex *buarthau* – SH 74972 52737, ‘Nentydd y Gorlan Lwyd’ (‘Streams of the Grey fold’) – SN8103020840 and ‘Buarth y Caerau’ (‘Fold of the Hill Fort’), SO0694113579.

Long after this work was first published, on 30th March 2025, during a walk along Afon Llafar, more dating evidence was discovered, at least in terms of some kind of building activity, if not the original construction period for the fold itself. This consists of an iron bar, its ends bent to aid a secure fit, used as a part-lintel for the inner stones above a creep hole. There are no grounds to consider it is a repair and thus it appears part of the intended construction, at least of this cell, whenever it appeared.



Iron bar part-lintel over an outer cell creep hole at Afon Llafar fold, NPRN 24404.



Yellow arrow indicates position of creep hole with iron bar. White arrows show robbing from old outer perimeter in later times, probably late 18th-early 19th century.

The cell featuring this bar is on the outside of the fold and may have been added at a time, perhaps a long time, after the fold was erected in any recognisable form. The lower stones around part of the perimeter of the fold do hint that these were robbed in order to rebuild and/or modify the form of the fold and it may be the bar was installed as a lintel at this point. Quite why it, rather than what must have been fairly readily-available stone in the immediate vicinity was used is unknown, but may simply reflect ready availability of such bars, possibly from the Penrhyn quarry nearby, and the speed and simplicity of using it, rather than searching for a suitable stone.



Underside detail of iron bar part-lintel, showing its use over a limited part of the creep hole opening.

The bar might appear to be from the very early 20th century but, again, it is difficult to know with any certainty and it could be somewhat earlier, perhaps from the mid-later part of the 19th century. There are clear signs of activity over some years of the 20th century within the fold proper, including the use of old telegraph poles, unlikely to be older than the mid-1920s, iron gates, also probably of that broad age, well-corroded steel wire, likely to be early 20th century and galvanized wire elements of a later date, together with some timber that, in the latter case, would be unlikely to persist for more than 25-30 years in such an environment.

A chance conversation with a passing local walker revealed that he knew the fold was in current use for the gathering, a claim that will need checking with the local farmers. None of this, of course, gets us anywhere in terms of determining when a structure identifiable as a sheepfold first appeared at this location. At the time of writing, no known effort by Cadw or other such bodies has made progress in obtaining dating evidence through the use of OSL on fold base stones.

Conclusions.

What does this, rather rambling text tells us? Perhaps it's best to ramble less, and bullet-point more:

- There has always been – and remains now – confident assertion about the age of *buarthau*. But no studies have been undertaken to provide any evidence and this seems to be true also of the ubiquitous dry stone walls of the area. Such assertions are therefore suspect, based only on the recent narrative of enclosure and unproven. Some good physical dating evidence, pointing to the 18th-19th century, was discovered during the present work, but can only be held to be valid for that *buarth*.
- The formal archaeological and heritage bodies of Wales have been what can only be said to be shamefully slow in examining *buarthau* in detail and, more especially, to arrange for dating studies by OSL to be undertaken. At the time of writing, no such studies have been performed, despite the presence – within Wales – of a world-class OSL laboratory at Aberystwyth.
- The sheepfolds – *mgari* – of Croatia are central to the identity and promotion of that country's heritage. Wales' *buarthau*, meanwhile, remain completely ignored and not widely known amongst the public. Interest in high-quality drone images of *buarthau*, however, proved remarkably popular on social media platforms, as revealed by high re-posting rates. RCAHMW featured one of this study's images on its own 'Twitter' page in late summer, 2023.
- Interest in Wales' *buarthau* is today being led by a small number of amateur investigators; the professional industry is slow to pick up the lead.
- Earlier assertions that multicellular sheepfolds of the general form of those found in north Wales are not found elsewhere in the UK or more widely are shown in this work, which also draws on the work, especially of Kremenčić in Croatia, to be definitively incorrect. Within Wales itself, the occurrence of *buarthau* is closely correlated with the highest mountainous terrain. Given their function, this is not in fact unexpected.
- Musings about what the precise style and features of *buarthau* might tell us are shown to be rather difficult to defend when objectively considered and the lack of evidence highlighted.
- There are some design features – notably the 'pointy-ended' cell wall shape – that occurs repeatedly, if not frequently, and required more study.
- Analysis of elevation of *buarthau* identified in the earlier stages of this work – the total continues to grow – shows the mean elevation to be 370m amsl. This merely reflects a 'middle-ground' between *hendref* and mountain summits; in Iceland, the typical height of *rettir* is closer to sea level, whilst in Switzerland, *farricha* can be found at well over 2000m.
- *Buarthau* in north Wales do not appear to have a 'favoured' aspect and 'aspect' was not clearly defined by Johnson. The present work shows that *buarthau* are located, entirely unsurprisingly, given their purpose, wherever there is or was a *hendref* not too far away. There are somewhat more *buarthau* on the eastern side of Eryri than the western.
- Past assertions that all *buarthau* are "long derelict" and thus not used today are definitively shown to be incorrect, as Johnson also highlighted. It is not impossible that some apparently disused *buarthau* may, nevertheless, be used on infrequent occasions, when circumstances might lead them to be useful. Similarly, those *buarthau* not used today could easily, where required, be repaired and/or modified and brought back into occasional or indeed regular use. Statements of certainty may not be advisable with respect to dry stone structures where resources, even today, remain scarce.
- Multicellular sheepfolds in different countries are often remarkably similar and often identical in form, showing that there is a logical and limited fashion in which livestock can be sorted efficiently. This is, in essence, gather to a larger, broadly central pen and sort to the surrounding cells.

- There are many structures in places like South Africa and Jordan that continue to be the subject of intense debate, but should be compared to multicellular folds discussed here. At least one researcher has advised the present author that the similarity between folds and ‘wheels’ has not previously been put forward, seemingly as those fold types were not known by wheel researchers. Most ‘wheel’ researchers, working in a very small, niche area of study, did not show themselves very enthusiastic to engage.
- Whether a buarth is ‘rectilinear’ or more ‘curvilinear’ is subjective and is unlikely to be a reliable indicator of age. Proper dating evidence may prove or disprove this view.
- Whilst Johnson believed she found evidence of ‘fossilisation’, the present work finds no compelling evidence for direct fossilisation at any site, though a small number of *buarthau* from the considerable total are clearly built very close to and possibly over earlier structures.
- There is a definite risk to understanding of *buarthau* – and Welsh heritage in general – from a demonstrated lack of ability in the Welsh language amongst the industry in Wales and the common use of English surveyors to whom the existence of a problem may not even occur. This can be seen as insulting and taboo, but is not intended to be and must be confronted objectively to avoid the kinds of difficulties highlighted. The Welsh Government must do much better at promoting fluent Welsh speaking within its offices and associated agencies.
- At the time of writing, changes in UK government and growing pressure from climate change means that pressure is growing significantly across the country, including Wales, to host renewable energy projects such as wind and solar farms. These will undoubtedly pose a growing threat to *buarthau* sites across Wales. There is no reason why damage or loss cannot be avoided with a better knowledge of the location of previously overlooked *buarthau* and siting of infrastructure. Indeed, such projects offer a potential opportunity to fund, as part of their ‘payback’ to the community, high quality and long-overdue research into these and other dry stone structures across Wales. Advancing the interests of such structures can be the concern of any interested member of the public who wished to put their case forward; the professional heritage industry seems more likely to dismiss them as unimportant and approve their destruction.
- Contact with the professional heritage industry within Wales was often disappointing and revealed a tendency towards a failure to accept ‘outside’ influences, particularly where the slightest suggestion of criticism was believed to be present, as revealed by a sudden refusal to engage further. The inter-reliance of various actors, including heritage-related businesses who contract to the public authorities, creates a ‘chilling effect’ on open discussion, everyone being careful, in this small, niche community, about what they say and where their interests may be impacted by such comment. It should not be like this. The primary observation and criticism – that the professional heritage industry within Wales must engage with and involve the public in a much better, meaningful way in relation to the future of threatened heritage structures – remains a valid one that ought to be addressed in a mature, confident way. There is no sign that this is seen as necessary by that industry, an attitude made worse by the present era of seriously-eroded public services and the consequent lack of resources and risk to jobs. We should be careful that all these undesirable effects do not lead to an acceleration of heritage loss.
- Fiona Johnson’s undergraduate dissertation, whilst sometimes seemingly torn to pieces in the present work, is simply undergoing a normal academic critique. Her work unquestionably secures its position as a valuable text of its time in fairly accurately recording a few *buarthau* when web-based satellite imagery and drones were simply not available. Many of her conclusions, however, were based, by her own contemporary admission, on weak or absent evidence. A lack of Welsh caused some, relatively minor difficulty. Most importantly of all, Johnson’s work ensured the quiet and beautiful presence of our *buarthau* - and the lack of study surrounding them - was highlighted at the end of the 20th century. Johnson’s work, however, is now of considerable antiquity and ought to be read with that qualification. Researchers should, for they almost universally do not, ensure they highlight Johnson’s work was an undergraduate dissertation and not a peer-reviewed study.



Above: Slate quarrying at Rhiw Bach ceased in 1952, when smothering of a buarth stopped, allowing a corner and short herding wall to continue announcing its presence. No NPRN assigned, SH73920 46335, 420m amsl. The Roman road of Sarn Helen runs immediately next to the fold and under the tip fans. Drone image of 2023 October 03, 13:32UT.