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# Y Llethr

## Highlights

A unique site showing periglacial features which are evidence of the 16th to 18th Century 'Little Ice Age'.

## Introduction

Y Llethr is a unique geomorphological site in the Rhinog Mountains which exhibits an unusual range of periglacial landforms, some of which may be associated with the climatic deterioration of the 'Little Ice Age', c. 1550–1750 AD (Lamb 1967). Detailed accounts of the features at the site have been provided by Coacher and Ball (1969) and Ball and Goodier (1970).

## Description

The site occurs on the north-facing slopes of Y Llethr [SH 659 261] between 600m and 754m OD, and the features, which include striped ground, terraced slopes, gliding blocks and stone-banked lobes, cover a total area of some 25ha. The generally smooth relief of the summit and flanks of Y Llethr is controlled by the underlying shales of Cambrian age. There is very little drift in the immediate area.

The partially-sorted stripes are of a small-scale pattern and occur on slopes between 15° and 30°; they comprise a series of prominent vegetated ridges and troughs orientated perpendicular to the local contours, with a repeat distance of c. 0.7–1.0m and an amplitude of c. 0.1–0.2 m (Goodier and Ball 1969). On the steeper slopes below, the stripes merge with well developed terracettes. Fine examples of 'gliding blocks' also occur, with frontal soil 'bow-waves' and pronounced upslope furrows, indicating movements of up to 13m. The most significant feature of the site, however, is an old stone wall built before 1815 (and possibly Mediaeval in age), which has become disrupted into a series of 'stone-banked lobes' by gelifluction processes (Goodier and Ball 1969).

## Interpretation

Goodier and Ball considered that the displaced wall was important for assessing the period of formation for the features seen at Y Llethr. This wall runs along the northern slopes of the site at altitudes between 600m and 700m OD. It is a dry-stone wall and its independence from the later nineteenth century boundary system in the area, and its comparative state of collapse, indicate that it is of great age: local records indicate a probable Mediaeval age. The wall is down-thrown along its entire length, and its component boulders, which range in size from 30–50cm, have been rearranged differentially, so that stones occur in a lobate pattern towards the steeper slopes. An estimated maximum movement of some 9m downslope is indicated by the lobes; although, where the wall has become totally disrupted, downslope movement may have been as much as 30–40m (Goodier and Ball 1969).

Goodier and Ball considered that gelifluction and cryoturbation had played an important role in forming the stone lobes, and it seems extremely likely that frost-action was also involved in the formation of the adjacent stripes. There is little evidence to suggest that the features at Y Llethr are the result of contemporary frost-action: both the fossil stripes and gliding blocks appear stable at the present time and the stones in the wall show no signs of contemporary movement. Historical records confirm the presence of 'old' walls in the area during construction of newer walls in the nineteenth century, and there is no evidence that these later walls have in any way been disturbed by solifluction. This suggested to Goodier and Ball that the old wall had been disrupted by a period of gelifluction sometime between Mediaeval and nineteenth century times.

Both Manley (1964) and Lamb (1967) have shown that a period of extreme cold, the coldest in Britain in historic times, occurred between c. 1550 and 1750 AD — a period referred to by Lamb as the 'Little Ice Age'. It has been demonstrated

that land and sea-ice in Britain during that period was at its most extensive since the end of the Younger Dryas at around 10,000 BP. Goodier and Ball (1969) considered that the historically dated evidence showed that periglacial conditions had probably formed all the Y Llethr features, and noted that stripes of a similar scale elsewhere in North Wales at Moelwyn Mawr, Yr Aran (Snowdon) and Y Garn (Y Glyderau) may also have been formed during the same 'Little Ice Age'.

Y Llethr provides the only documented occurrence of periglacial landforms in Wales that date from the 'Little Ice Age', and the site therefore provides contrasting evidence to that at nearby Rhinog Fawr, where large-scale stone stripes have been ascribed to the end of the Late Devensian, prior to the Younger Dryas. The features at Y Llethr also contrast with contemporary cold-climate landforms described from the Carneddau (Tallis and Kershaw 1959) and Moelwyn Mawr (Taylor 1975). These sites are important for demonstrating considerable diversity in the ages of periglacial landforms in the uplands of North Wales. In particular, the stone-banked lobes formed by collapse of the Mediaeval wall, may have important implications for interpreting small-scale periglacial features of unknown age found elsewhere. Although Goodier and Ball (1969) argued a strong case for ascribing the stone-banked lobes to the 'Little Ice Age', there is no clear evidence which dates the other periglacial features at the site to the same period.

Y Llethr is important for exhibiting an unusual range of periglacial landforms, including partially-sorted stone stripes, terracettes, 'gliding' (ploughing) blocks with prominent bow waves and furrows, and a stone wall deformed by gelifluction.

Documentary records provide evidence to suggest that this wall is Mediaeval in age and that its collapse probably occurred in the climatic deterioration of the 'Little Ice Age' between c. 1550–1750 AD. This is the only known occurrence of periglacial activity in Wales from this period.

## **Conclusions**

Y Llethr is a site of outstanding importance because it contains evidence for cold-climate processes during the 'Little Ice Age'. One of the most interesting features is the disturbance of a Mediaeval wall by periglacial slope processes. This site may well be the standard for similar, but as yet undiscovered, examples elsewhere in Britain.

## **[References](#)**