Moelwyn Mawr

Highlights

Here are associated a probable Devensian late-glacial rock glacier and periglacial patterned ground. The latter is regarded as being still active.

Introduction

There are two controversial landforms at Moelwyn Mawr [SH 660 450]. At Cwm Croesor a series of transverse boulder ridges and debris spreads have been interpreted as a fossil 'rock glacier'. Nearby, on the north-east flanks of Moelwyn Mawr, a series of well developed, apparently unsorted vegetated stripes occurs; some of the finest examples of their kind in Wales. The stripes have been studied by Taylor (1975), and preliminary studies of the fossil rock glacier were made by Lowe and Rose (*in* Gray *et al.* 1981).

Description

Patterned ground in the form of small-scale vegetated stripes occurs between 550m and 720m on Moelwyn Mawr [SH 662 452]. The stripes occur on slopes between 15° and 30° and they cover an area of about 20ha. They overlie parent material of Ordovician Croesor Slate (Fearnsides and Davies 1944; Beavon 1963; Taylor 1975). The surface vegetation is a grassland community with a scattering of some heather. The patterned ground consists of a series of ridges and furrows, the corrugations having a wavelength of c. 0.8m and an amplitude of 0.2m. The stripes are completely vegetated, and there is little differentiation in vegetation type between the ridges and furrows. Some lineation downslope of large unvegetated stones was noted by Taylor (1975).

A feature interpreted as a fossil rock glacier has been described by Lowe and Rose (Gray *et al.* 1981) on the north face of Moelwyn Mawr [SH 656 453]. The feature comprises a series of transverse boulder ridges with a steep scarp front and areas of pitted boulder strewn terrain. Well developed lateral ridges occur at the margins of the transverse ridges. The whole rock and morainic debris complex extends for about 300–400m NNW into Cwm Croesor from a small north-facing cirque-like feature. A shallow depression separates the rock accumulation from the head wall (Gray *et al.* 1981).

Interpretation

Patterned ground

Patterned ground was first described on the flanks of Moelwyn Mawr by Goodier and Ball (1969) and Ball and Goodier (1970). They noted that the stripes were on a similar scale to those found in the Rhinog Mountains at Y Llethr and at several other localities in Snowdonia. No dating or interpretation of the features were given, but it was suggested that the features were active, and were maintained by seasonal needle-ice (pipkrake) formation (Ball and Goodier 1970).

The stripes on Moelwyn Mawr were studied in greater detail by Taylor (1975). He described the vegetation and morphology of the features and constructed a map of a sample area of the stripes. Both mechanical and structural analyses of the soil were undertaken which showed particle sorting within the stripe pattern, but only within an extremely narrow size fraction (Taylor 1975). The high water content and low structural strength of the ridges was taken as evidence that they were probably maintained by active contemporary frost-assisted processes. He considered that in the absence of such processes, the ridges would probably have collapsed in response to heavy grazing and subaerial compaction. Taylor showed that although the stripes appeared superficially unsorted, mechanical analysis had proved there to be some sorting; and it seemed likely that wherever patterned ground occurs some sorting had taken place, even if this is not reflected in preferential growth of vegetation.

Together with sorted polygons in the Carneddau and similar scale vegetated stripes elsewhere in North Wales (Y Garn and Y Llethr), the stripes at Moelwyn Mawr provide evidence for formation, or at least maintenance, by contemporary frost-assisted processes. These features provide contrasting evidence to the larger-scale stripes at Rhinog Fawr and the Stiperstones which are believed to be fossil periglacial features.

Fossil rock glacier

Preliminary observations of this feature were made by Lowe and Rose — see Gray *et al.* (1981). The debris tongue extends into the Croesor Valley, well outside the confines of the cirque, and it appears to be flanked by distinctive lateral accumulations of postulated morainic material. This is the only documented occurrence of a fossil rock glacier in Wales, and little is known about its precise age and origin.

A possible analogue is the tongue-shaped postulated rock glacier described at Beinn Alligin, on the north side of Loch Torridon in Scotland (Sissons 1975, 1976). This is the largest such feature in Scotland, for which a variety of modes of formation has been suggested. Sissons (1975) considered that the feature had probably formed towards the end of the Loch Lomond Stadial (Younger Dryas) when a small decaying glacier was submerged by rockslide debris, which was subsequently reactivated as a rock glacier. In contrast, Whalley (1976) suggested that the feature was simply a rockslide. Further work at Moelwyn Mawr could provide a variety of hypotheses to explain the formation of the feature. At present it could be postulated that the so-called rock glacier was formed by unusually heavy rockfalls that submerged a small cirque glacier of Younger Dryas age; detailed pollen analytical and geomorphological studies elsewhere in Snowdonia have shown that this period was significant for widespread glacier growth within the region's cirques. As a result, numerous moraines and boulder limits of an extremely varied nature were developed, and it might be that specific local geomorphological and geological controls led to development of a rock glacier at Moelwyn Mawr.

Conclusions

The fossil rock glacier at Moelwyn Mawr is important as the only such feature so far described from Wales. As yet, its age and mode of formation are indeterminate. The well developed vegetated stripes enhance the interest of the site. They are some of the finest examples in Wales and provide important evidence for formation, or at least maintenance, by contemporary frost-assisted processes. These features may provide important evidence about climatic change and processes in upland regions.

References