
Afon Twymyn at Ffrwd Fawr, Powys

[SN 869 955]–[SN 873 940]

G. Higgs

Highlights

This is an unequivocal case of upland river capture by a steeper westward-flowing river. At this site there is a set of classic features that is rarely so complete, although the features are not easily dated or straightforward to interpret.

Introduction

The Twymyn at Ffrwd Fawr [SN 873 939] provides an excellent example of the response of a river system to rejuvenation, in this case due to the capture through headwater retreat of a river that originally flowed eastwards to enter the Clywedog catchment (8893). Subsequently, the river flowed northwards, leaving remnants of an old river valley as a dry col. Little work has been done to identify the date of such a capture, but a later period of glacial deepening of the valley has created a spectacular gorge section. The river downstream of the gorge reverts to one characterized by downvalley meander loop translation, with gravel deposition features and evidence of recent channel change, including abandoned channels (Lewin, 1983).

Description

Three kilometres from its source, the Afon Twymyn falls 50 m over Silurian sandstones at Ffrwd Fawr before entering a 350 m deep gorge. Downstream of the waterfall, the river is constricted to a bedrock channel less than 2 m wide in places. Harder bands of shales and grits are preserved as overhangs on the face of the falls, which is one of the highest virtually unbroken descents of water in Wales. At the base of the falls there are blocks of sandstone up to 2 m in length. The bed-load of the river at this point is largely angular, suggesting that the face of the falls as well as the adjacent rock slopes provide active inputs to the system. For 50 m below the waterfall, the river flows in a relatively shallow gradient bedrock channel before being confined further at a smaller waterfall (with a 20 m fall). The gradient increases for a further 100 m upstream of a sharp elbow-bend in the river course, which represents the point at which the river once flowed eastwards but now has been captured (Figure 3.7). The right bank of this section shows evidence of soil creep and erosion scars where there has been active input into the system of finer material, whereas the left bank is characterized by scree deposits at the base of rock slopes. In some places such debris has been colonized by vegetation and is relatively stable at low flows. However, there is evidence of some basal undercutting of such deposits at higher flows with overhanging vegetation, so that, in addition to the active input from the adjacent scree slopes of largely angular material, there is also input to the system of finer silt-sized material in flood events. This has been aided in places by the effects of sheep grazing which has resulted in the destabilization of banks.

After a decrease of just over 100 m in altitude over 1.25 km, the river enters a widened valley as it approaches Pennant [SN 875 955]. Here the section is characterized by depositional features such as gravel point and counterpoint bars. Such features, as well as the nature and extent of channel change, have been examined for a lower section of the Twymyn [SN 885 998] by Lewin (1983).

As well as rejuvenation of the main stream, river capture has resulted in the downcutting of the tributaries of the Twymyn, and in particular that of Nant Bryn-moel [SN 864 947], upstream of the falls, and that of Nant Ddeiliog [SN 867 953] downstream of Ffrwd Fawr. These tributaries have coarse material in their channels, but provide active inputs to the system only during extreme events. There is evidence of erosion of bedrock in places and of the undercutting of superficial debris by such tributaries. These materials are deposited as scree at the base of slopes, which is removed only during extreme events.

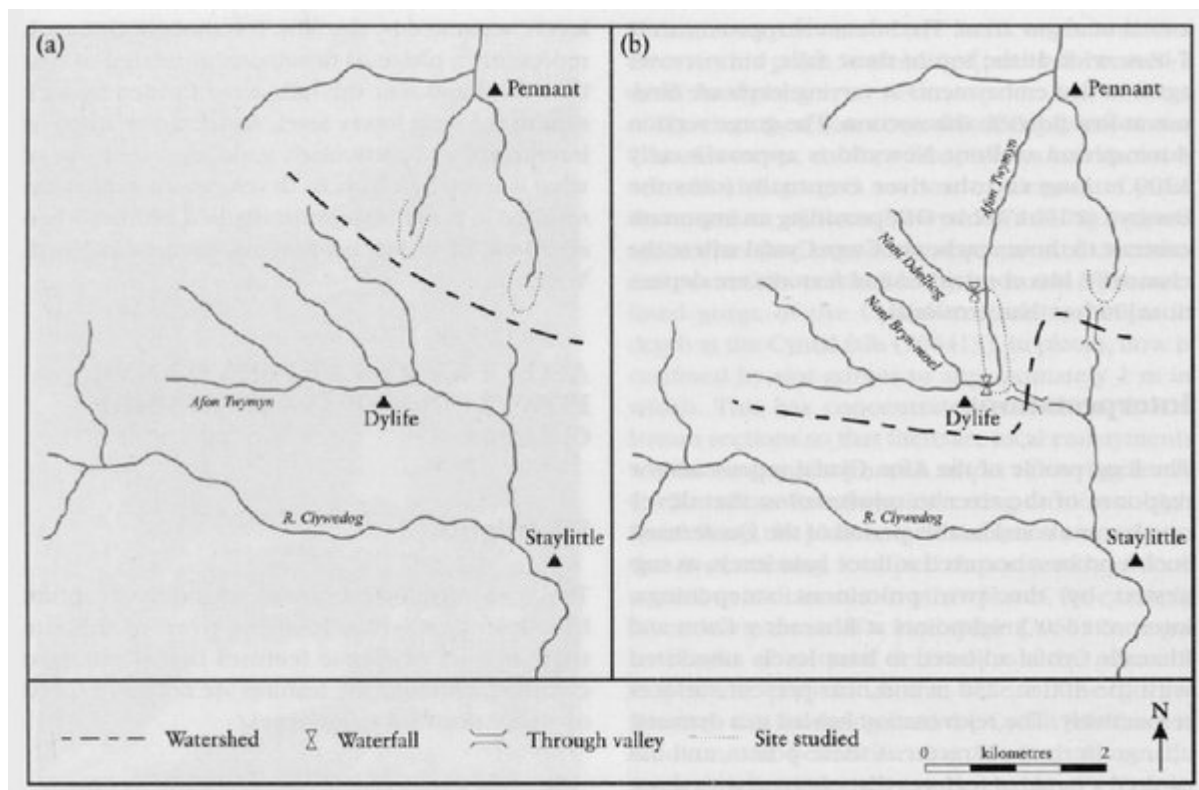
Interpretation

The formation of the Ffrwd Fawr waterfall and the spectacular gorge of the Twymyn has been attributed to the actions of glaciers in the overdeepening of the valley, and in the headward erosion of cirque glaciers. The original flow of the Twymyn was eastwards, until it joined the Clywedog ((Figure 3.7)a). However, the headward retreat of the watershed resulted in the capture of this proto-stream (Millward and Robinson, 1978). This capture was aided by local faults (which were the locations of the minerals mined in the 1870s and 1880s (notably the Ty Isaf and Llechwedd lodes)), and by the differential erosion resulting from the geological strata of shales, grits and sandstones of the Middle and Lower Llandovery series (Silurian). The dry valley that remained after this capture (Figure 3.7)b is now occupied by conifer trees and is at a higher level than the present channel, suggesting that capture has resulted in the rejuvenation of the stream. Such a hypothesis, Millward and Robinson suggested, is supported by the generally easterly flow of the tributaries, Nant Bryn-moel and Nant Ddeiliog, and the rejuvenated nature of the latter, which culminates in a waterfall. It was further proposed that such capture was recent, although no work has been done to confirm this. The misfit stream of the Afon Nachog which enters the Clywedog Reservoir [SN 885 923] is totally out of proportion to the size of the valley, which would tend to confirm the case for river capture. Thus the features of the Twymyn would seem to result from a combined effect of river capture, glacial overdeepening and preferential erosion of softer Silurian rocks, together with the influence of local geological structure (fault zones). The river is unique in terms of the assemblage of features in such a confined area, showing the relationship between river capture, glacial effects and geological controls.

Conclusion

This site comprises features typical of river capture, but waterfalls and a gorge also owe their formation to glaciation and the influence of bedrock control.

References



(Figure 3.7) The Afon Twymyn: drainage changes near Dylife.