Aysgarth, North Yorkshire

[SE 014 887]

Highlights

Aysgarth Falls, in the Ure valley of north Yorkshire, is a spectacular example of a knickpoint in the long profile of a river. Glaciofluvial processes occurring during deglaciation have eroded less resistant rock to leave steep stream gradients, creating a series of cascades, Aysgarth Force, High Force and Middle Force.

Introduction

Aysgarth represents a classic example of a stepped fall. It developed where a knickpoint was held up by relatively resistant bedrock. The site is also important in the context of the deglaciation of the area. The Devensian deposits at Bear Park, originally described as a moraine, have also been interpreted as a complex of glacio-fluvial deposits associated with glacial meltwaters, which may also have contributed to the formation of the present morphology of the falls.

Description

The valley of the Ure lies geologically in a general downwarp between an anticlinal area to the north of the Swale and the half dome to the south. Aysgarth represents one of the many conspicuous waterfalls that occur where knickpoints have been held up by hard rocks. Well-developed drumlins occur in Upper Wensleydale as far down the main valley as Aysgarth, where till deposits become less evident, except on the spurs where tributary valleys enter Wensleydale. Over 80 large drumlins can be seen in the 20 km west of Aysgarth.

The river Ure cuts through a broad belt of mounds of debris crossing the valley at Aysgarth at about 215 m OD, and now flows through a deep rock gorge, above the sides of which are a few exposures of the glacial deposits.

Above Bear Park is a possible lake flat 5 km long and 1 km wide, with the present surface at 195 m OD, and some of the mounds reach between 4 m and 12 m above this level. This part of the valley is a true rock basin, and the gorge that drains it is one of the finest gorges in the district. The river descends 60 m in less than a mile by the cascades of Aysgarth Force, High Force and Middle Force (Figure 6.39). The valley of Upper Wensleydale hangs considerably above Bishopdale, the tributary valley from the south.

Interpretation

The development of Aysgarth Falls has to be seen in the context of the deglaciation of Wensleydale. During the last glaciation this dale, like other Yorkshire dales, was occupied by local glacial ice. At an early stage in the erosional history, it was suggested by King (1935) that at the location of Aysgarth Falls there was a steeper part of the valley long profile. It may be that this fall and the constriction of the valley facilitated the separation of masses of ice and led to the further development of Aysgarth Falls.

Originally, it was proposed by Raistrick (1926) that the stages of deglaciation of Wensleydale could be interpreted in relation to an active ice margin that retreated so that a series of moraines could be identified across Wensleydale. Raistrick proposed how each of these moraines could be related to lateral moraines and ice marginal drainage channels that he identified on the sides of the dale. He suggested that the Bear Park deposits were a major recessional moraine related to one of the stages of recession of the ice margin. He argued that the size of the moraine indicated a long pause in ice margin recession, during which the ice in the upper valley must have been eroding little, if at all. In contrast, Bishopdale and the lower Ure valley were being scoured by the meltwaters of the upper area.

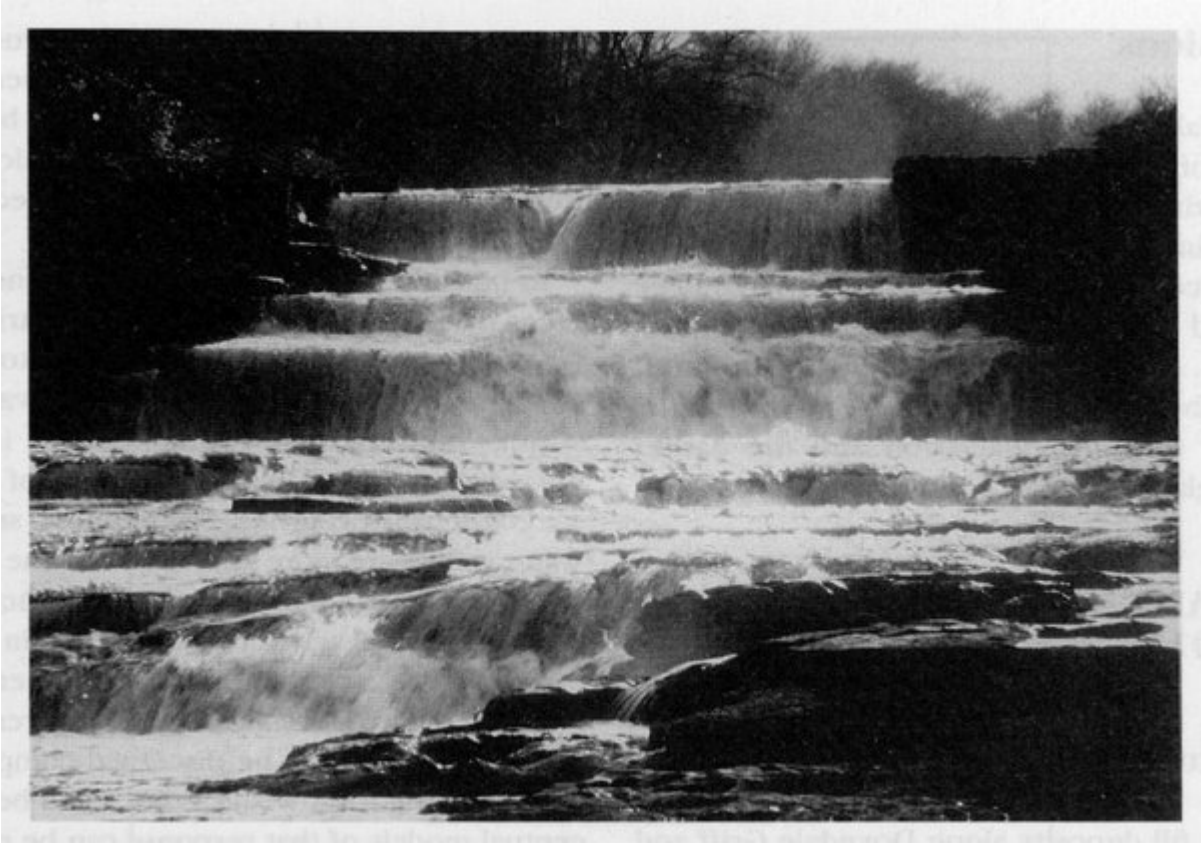
However, in the valley downstream from Aysgarth Falls, there is a complex of glacio-fluvial landforms. This is made up of eskers and kettles which combine to produce a pattern of features which indicate that, when they were produced, the ice in the valley floor must have been stagnant. Subsequently, downstream near Wensley, these glacio-fluvial features are succeeded by a series of low terraces.

More recent investigations of these glacio-fluvial features, (e.g. by Cullingford and Gregory, 1978) have proposed that the pattern of deglaciation was characterized by the stagnation of the valley glaciers. The development of stagnant ice was influenced by the stepped morphology of the sides of Wensleydale, which led to the progressive isolation of masses of ice that were comparatively thin. Aysgarth Falls is significant in this pattern of deglaciation because the water draining within and beneath the stagnant ice must have flowed over the present location of the falls. It therefore seems likely that erosion by meltwater during deglaciation contributed to the morphology of Aysgarth Falls.

Conclusions

Aysgarth Falls is an important feature in the interpretation of the deglaciation of Wensleydale. The deposits within which the falls are set have been explained in relation to a major recessional stage of the local ice; and more recently they have been interpreted in the context of the decay of stagnant ice blocks. In the development of such features, the contribution of erosion by large volumes of meltwater during deglaciation and the earlier effects of glacial erosion must be considered.

References



(Figure 6.39) Lower Force, Aysgarth Falls. (Photo: I.D. Hooper.)