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## Conistone Old Pasture

[SD 98 67]–[SD 99 66]–[SD 99 68]

### Highlights

The area around Conistone Old Pasture, on the east side of Wharfedale near Conistone, contains two fine meltwater valleys, one with an excellent dry waterfall and the other a classic narrow gorge section. Between these two valleys is a superb expanse of well developed limestone pavement.

### Introduction

The two dry valleys on Conistone Old Pasture are fine examples of channels incised by meltwater at the end of the last glaciation. They lie in the eastern flank of the glacial trough of Wharfedale, beneath a limestone bench which carries areas of well developed pavement. Conistone Dib provides a spectacular illustration of fluvial incision in a limestone area, and admirably demonstrates the role of jointing in determining the form of its gorge section. Dib Scar is an impressive dry waterfall that invokes debate on the role of cave undercutting in its formation. Although little has been written specifically about these sites, they are important examples of their representative landforms. The valleys are briefly described by Sweeting (1974) and Waltham (1984) and the pavements are referred to by Goldie (1976, 1981, 1993).

### Description

The dry valley of Dib Scar lies south of Conistone village and the Old Pasture plateau (Figure 2.49). It is less than 1 km long, descending from a broad col out of a broad and shallow closed depression. It is entrenched up to 30 m into the strong Carboniferous Great Scar Limestone. Its main feature is Dib Scar, a fine dry waterfall that now forms an overhanging limestone cliff, 20 m high, at the head of a short gorge with vertical sides. Immediately east of its namesake village, Conistone Dib is a longer and larger dry valley. It is incised by up to 60 m as it descends 120 m through the Great Scar Limestone. The upper end of the valley has a broad grassy floor where it collects three short tributaries; its sides are scored by solifluction ter-racettes (Figure 2.50). Downstream it narrows into an impressive ravine, often referred to as the Gurling Trough. This is cut into two of the stronger limestone beds, with its form influenced by the joints. The walls pinch in to less than a metre apart at one point, and have fluvial potholes and old swirl pool sites on the bends. The gorge descends gradually until it widens to die out at the edge of Conistone village. The overhanging limestone cliff of Kilnsey Crag rises on the opposite side of Wharfedale; it is a glacially truncated spur, and its only karstic feature may be that its foot was undercut by lateral solution when a postglacial, moraine-dammed lake lapped against it.

The limestone plateau above the dry valleys lacks any surface drainage. It is a broad feature with disorganized low relief, with shallow, broken troughs aligned parallel to Wharfedale. Close to the dry valleys there are fine expanses of limestone pavement and small rocky scars in the stronger and more massive beds. Above Hill Castles Scar the pavements are horizontal with blocky clints less than 1 m by 2 m on average, and shallow grikes with a mean depth of 0.7 m (Goldie, 1976). Solution runnels are mainly smooth rundkarren, and there is great variety in morphological detail with excellent kamenitzas and small-scale rippling and pitting. Nearer to Dib Scar, the limestone slabs dip as much as 15°, and longer solution runnels are orientated down their slopes.

### Interpretation

The fluvial gorges have been interpreted as glacial meltwater channels active when underground drainage was impeded by permafrost and glacial debris (Sweeting, 1974; Waltham, 1984). The dry gorge at Dib Scar is a classic example of gorge formation by waterfall retreat. It was incised at the tail end of the Devensian glaciation by meltwater flowing down a channel from the fells above, perhaps from or under the snout of a retreating glacier. At the location of Dib Scar this flow crossed a resistant bed of limestone, whose face retreated beneath the sediment-laden water to form the tapering gorge

seen today. The waterfall was subsequently left dry by the climatic amelioration when underground drainage resumed. Cliff undercutting and cavern formation may have played minor roles in the development of the waterfall, but modern weathering and frost action are degrading its form.

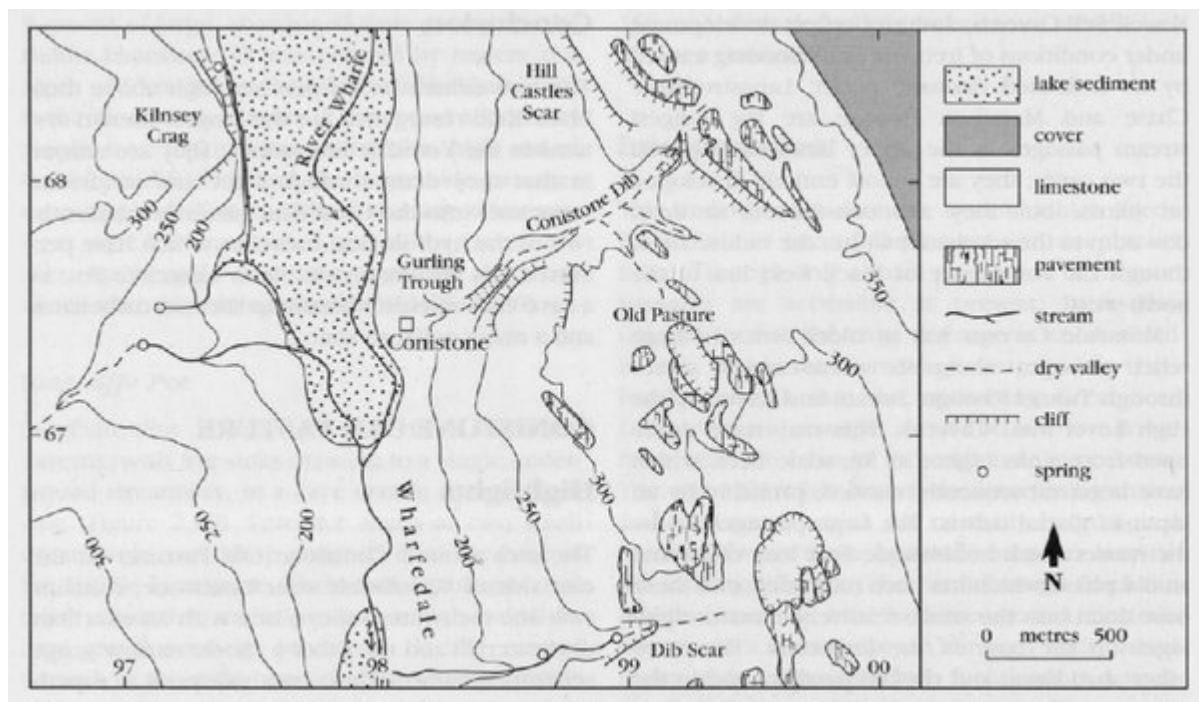
Conistone Dib was a second meltwater channel, which once carried a large stream. This may have been fed from a retreating glacier lobe on the plateau above, but its source could have been related to ice margin meltwater flows which may have excavated the linear depressions parallel to Wharfedale on the limestone plateau (Raistrick, 1931). The upper gorge section occurs where the meltwaters incised through the stronger limestone beds of Hill Castles Scar, and the Gurling Trough gorge is cut into the same strong beds of limestone as is Dib Scar. The whole feature was probably incised very rapidly at the end of the Devensian glaciation, and was abandoned by the resumption of underground drainage in the more temperate Holocene climate.

The limestone pavements are restricted to the ice scoured bench less than 400 m wide along the rim of the Wharfedale glaciated trough. They occur on the outcrops of the more massive beds of limestone, away from the meltwater channels which score the bench and the slopes below. The rundkarren are well developed, but clint sizes are restricted by the closely spaced rock joints. The shallow grike depths suggest that the top layer of Clint blocks may have been extensively removed (Goldie, 1981), perhaps during construction of the many early Celtic settlements on this bench.

## Conclusions

The dry valleys of Conistone provide two excellent examples of fluvial erosion processes on a karst terrain. Dib Scar is a classic illustration of a tapering retreat gorge with a dry waterfall at its head, and is comparable to Malham Cove without the involvement of glacial excavation. The larger Conistone Dib, with its fine gorge section, is a superb demonstration of the role of fluvial erosion by glacial meltwater under periglacial conditions in a karst terrain. The well developed limestone pavements offer a wide variety of morphological detail and show clear response to structural control, valley and soil formation.

## References



(Figure 2.49) Outline map of the dry valleys, scars and limestone pavements of Conistone Old Pasture. Cover rocks are the shales and limestones of the Yoredale facies, above the Great Scar Limestone.



*(Figure 2.50) The dry valley of Conistone Dib, seen from the limestone scars with Wharfedale in the distance. (Photo: A.C. Waltham.)*