River Cherwell at Trafford House, Northamptonshire

[SP 528 487]

Highlights

The River Cherwell and the Eydon Brook (Figure 6.24) are both examples of underfit streams where morphological and sedimentary evidence suggests that the streams conveyed greater discharges in relation to palaeohydrological conditions during glacial periods.

Introduction

The Upper Cherwell and the Eydon Brook are excellent examples of underfit streams, their channel dimensions being much reduced when compared with those described by the subsurface contours. At Trafford House (Figure 6.25), the deposits occupy an old channel that is still visible on the surface and is abandoned by undercutting. They include alluvial material, shell debris and tufa from an adjacent limestone face, confirming the condition of the streams as underfits.

Description

The source of the Cherwell lies in a belt of dissected country where hills of Upper Lias, capped by Northampton Sand, overtop the broad structural bench of Middle Lias Marlstone. Drift deposits of importance in the present context are found in the two left-hand tributaries; one being Eydon Brook at Trafford House [SJ 527 486].

The two streams are excellent examples of misfit, or more properly underfit, streams. The underfit condition is recognized by the fact that the meanders of the stream are described within the limits of the much more ample meanders of the valley.

Borehole investigations prove the presence beneath each floodplain of a channel much wider and deeper than the existing stream channel. The upper deposits consist of cloddy or moist and tenacious clay, while the lower deposits, confined largely to the deeper portions of the filled channels, are made up of black or dark grey silt, moist, very soft, and containing plant debris. The upper clay is interpreted as material which settled out of floodwater, while the lower silt may represent the former bottom load in the large channels, together with the remains of plants washed or fallen in.

In general, the greatest depths are recorded at the outside of valley bends. The width varies somewhat, tending to be greater at bends than in the intermediate reaches, but is roughly ten times that of the present stream channel. It seems beyond doubt that the filled channels were formerly the beds of large streams, much more powerful than the Cherwell and Eydon Brook of today. In (Figure 6.25) is illustrated the present-day Eydon Brook flowing between the banks of the former larger capacity channel.

The ratio between valley meander wavelength is approximately ten times as great as the interval between the meanders of the present stream. The meandering valley is in part cut into, and through, the deposits of Chalky Boulder Clay, so it follows that the loss of volume must post-date the glaciation.

The Trafford House site is particularly interesting because it contains certain deposits unlike anything so far discovered elsewhere — tufa, shell marl, peat and peaty clay occur here. These deposits occupy an abandoned channel that curves gently round a valley bend. The hollow formed by the enclosed ends of the abandoned channel received a variety of materials, but is not yet entirely filled.

Interpretation

A close relationship is postulated by Duty (1953) between an ice-front and the Cherwell valley, and the eastern divide of the Cherwell drainage has been termed morainic. However, the valley had been fashioned before the onset of the Chalky Boulder Clay ice.

The line of the Eydon Brook appears to have been determined during or before glacial times. Remnants of the sheet of Chalky Boulder Clay with associated underlying gravels occur on the high ground to the north and south of the valley of the Eydon Brook, whereas within it small patches of gravel alone remain. It seems probable that this valley received quantities of glacial gravel, most of which has now been cleared, and that the valley floor has been cut below the level reached when the gravel was deposited.

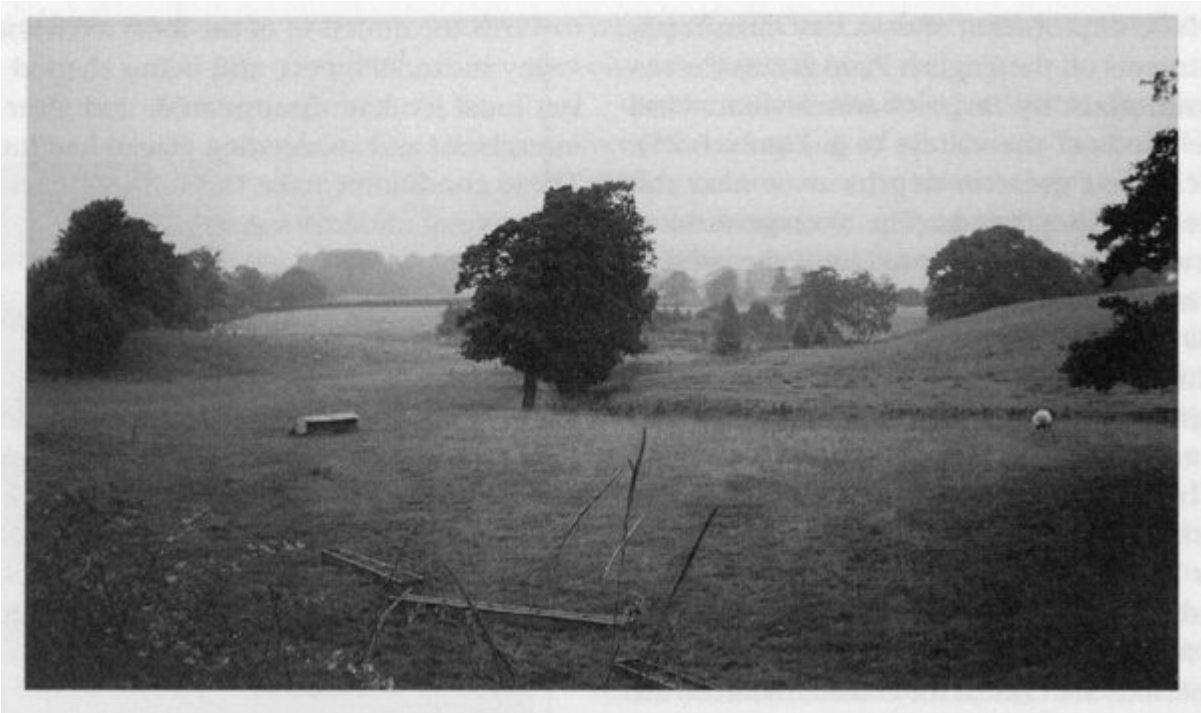
In certain localities of the upper Cherwell valley there is abundant scope for study of drifts, but it now seems well established that the valley system existed much as it is now before the arrival of the Chalky Boulder Clay ice. The conclusion that the size of the headwater catchment has changed very little since deglaciation, whether by capture or by divide migration, has a direct bearing on the problem of formation of valley meanders and cause of the present underfitness.

Identification of underfit streams and inherited valley meanders was an important development in fluvial geomorphology. These features remain valuable for determination of Quaternary chronologies and for palaeohydrological investigations. This site is particularly significant because of the unusual deposits in the abandoned valley meanders as well as its classic features of underfitness.

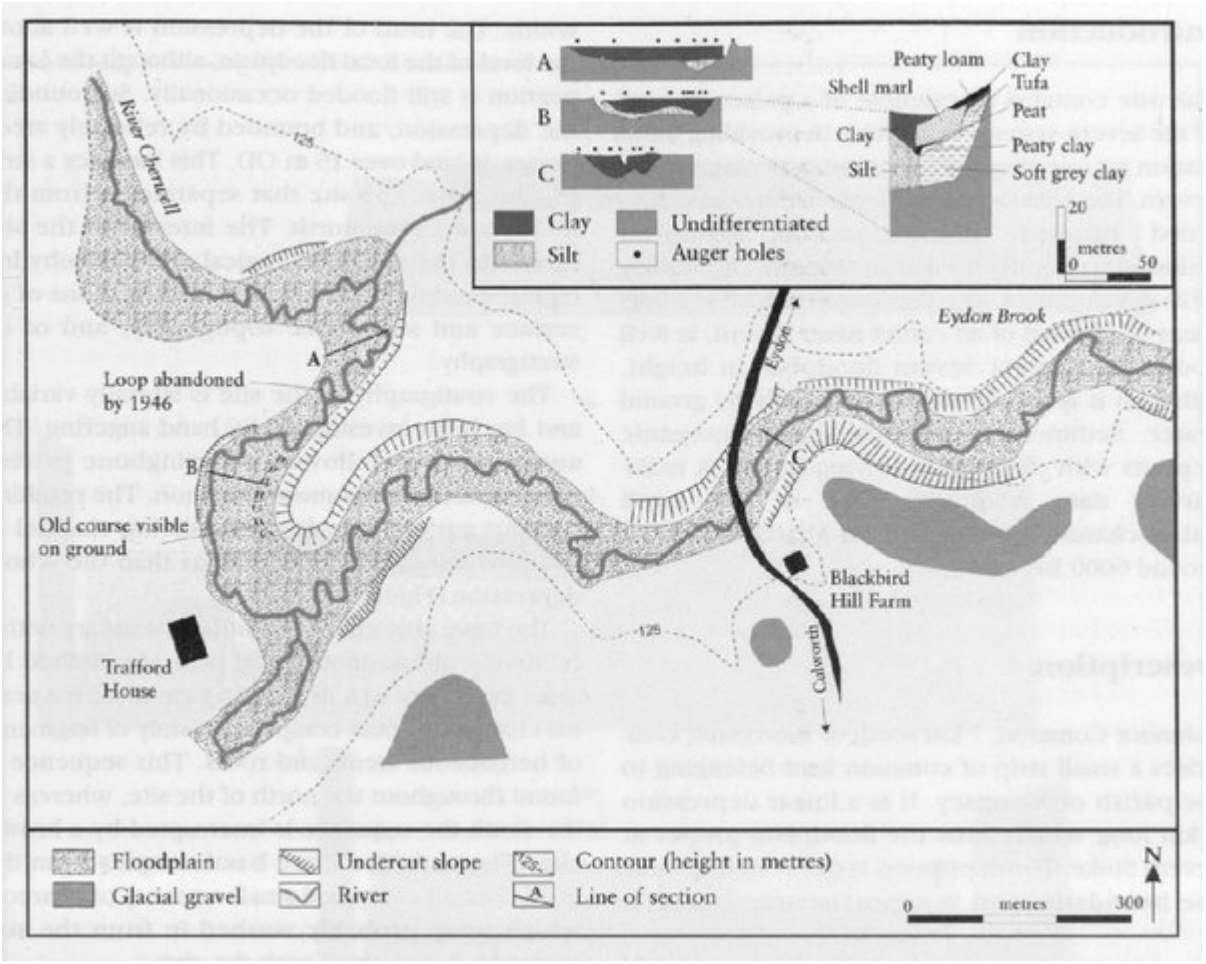
Conclusion

These streams are classic underfits. Their present stream meanders are well-developed within the valley meanders cut into the Chalky Boulder Clay. Two features of particular interest are the abandoned channel visible on the surface, and the deposits which have been deposited in it. The site has both intrinsic and potential value.

References



(Figure 6.24) The palaeochannel of the Eydon Brook, looking upstream to section C (of (Figure 6.25)). (Photo: R.J. Davis.)



(Figure 6.25) Palaeohydrological features of the River Cherwell and Eydon Brook. (After Dury, 1953.)