Brimble Pit and Cross Swallet

[ST 509 508], [ST 508 500]

Highlights

Brimble Pit and Cross Swallet are two of the finest closed drainage basins on Mendip, and together exhibit all the geomorphological features characteristic of Mendip closed basins. Both basins provide evidence of the periglacial development of lakes and overflow channels on the Mendip plateau during the last glaciation.

Introduction

A belt of twelve drainage basins extends along the southern rim of the Mendip plateau from Cheddar Gorge to Ebbor Gorge; they constitute a zone of polygonal karst (Figure 5.16). The Brimble Pit basin is one of the largest of the chain, while the adjacent Cross Swallet basin is smaller, but has a very distinctive internal morphology (Ford and Stanton, 1968). Both depressions once contained lakes which drained via a low col into associated overflow channels. The geomorphic significance of the closed basins was recognized by Ford and Stanton (1968), further elaborated on. by Barrington and Stanton (1977), and briefly described by Duff *et al.* (1985).

Description

Brimble Pit is a pool at the lowest point of a shallow depression 10 m deep, over 1000 m long and 500 m wide (Figure 5.16). The floor of the basin is covered in a thick layer of horizontally stratified loessic silty clay, pitted with small sinkholes, one of which contains Brimble Pit. The pool is artificial; it originated as a sinkhole whose sides were puddled with silty clay to provide drinking water for cattle, and is now fed by road drainage. The basin is bounded by very gently graded slopes, dividing it from neighbouring depressions and valleys. The south-eastern margin of the basin is marked by a low col which feeds into an overflow channel incised several metres into the flanks of the plateau. Brimble Pit Swallet is a cave excavated to a depth of 20 m beneath one of the sinkholes in the basin; it is developed along the line of a major fault zone occupied by vein calcite, and is infilled with Triassic and Jurassic neptunian dyke sediments. Water draining into this swallet from an adjacent reservoir has been traced to Rodney Stoke rising. Locke's Hole is another excavated sinkhole, which yielded siliceous gravels similar to those seen in the Westbury Quarry deposits a few hundred metres to the south.

The Cross Swallet basin is similar in depth, but is only 500 m in diameter (Figure 5.16). It also has a marginal col and overflow channel, but not as well defined as that at Brimble Pit. A clearly defined corrosion terrace has formed at the level of the col, and extends all the way around the basin, locally extending to 23 m in width. At one point, an undercut limestone bluff rises above it. The main basin floor is formed on an infill of horizontally laminated yellow-brown silty clay at a level 5 m below the edge of the terrace. The clays are over 7 m thick, and within them a closed depression is cut 8 m deep at the centre of the basin. Fissures in the limestone floor of this have been penetrated for about 10 m depth before they become impassably narrow (Figure 5.17).

Interpretation

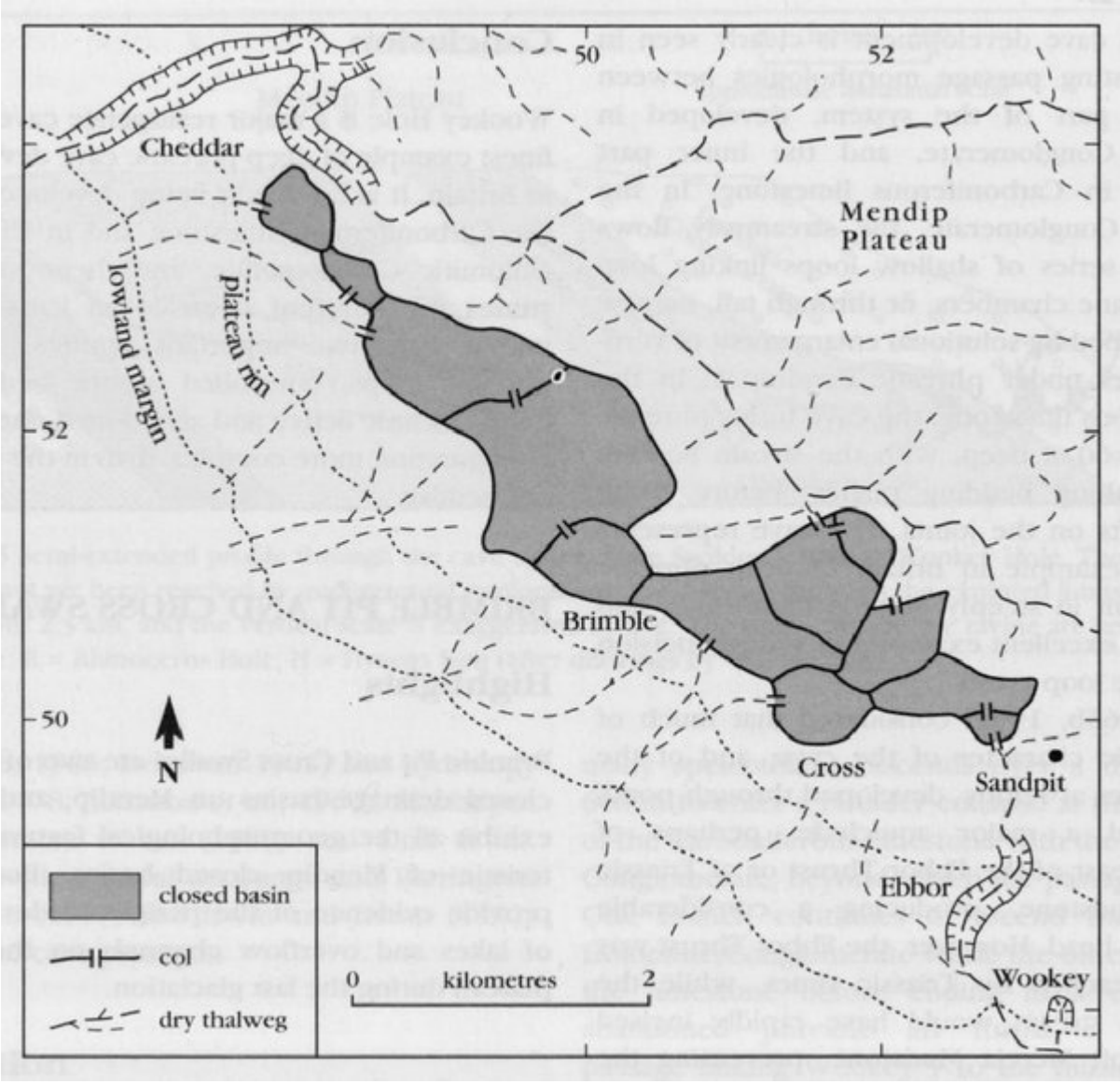
Ford and Stanton (1968) argued that the basins were initially formed by solutional activity during warm phases of the Pleistocene, and the sinks were blocked by permafrost during the ensuing cold periods. Meltwater became ponded during the brief summers until it spilled over the cols to cut the overflow channels. Hillwash, and perhaps windblown silt, formed the loessic silty clay deposited in the lakes, and helped seal the lake beds. In the Cross Swallet basin, the presence of the terrace indicates a stable lake surface at the col level. It is suggested that hydrostatic pressure was great enough to maintain slow talik leakage through the clay and the underlying permafrost into the limestone beneath.

The two basins combine to show all the features associated with Mendip closed depressions. These include cols leading to overflow channels, a terrace at col level etched into the limestone, old lake deposits forming flat thick clay floors, subsidence sinkholes developed in the clay fills, and impenetrable or choked caves developed below the sinkholes. Further work on the sedimentology and palynology of the loessic clay could provide important evidence on the palaeoenvironment in which the lakes were formed.

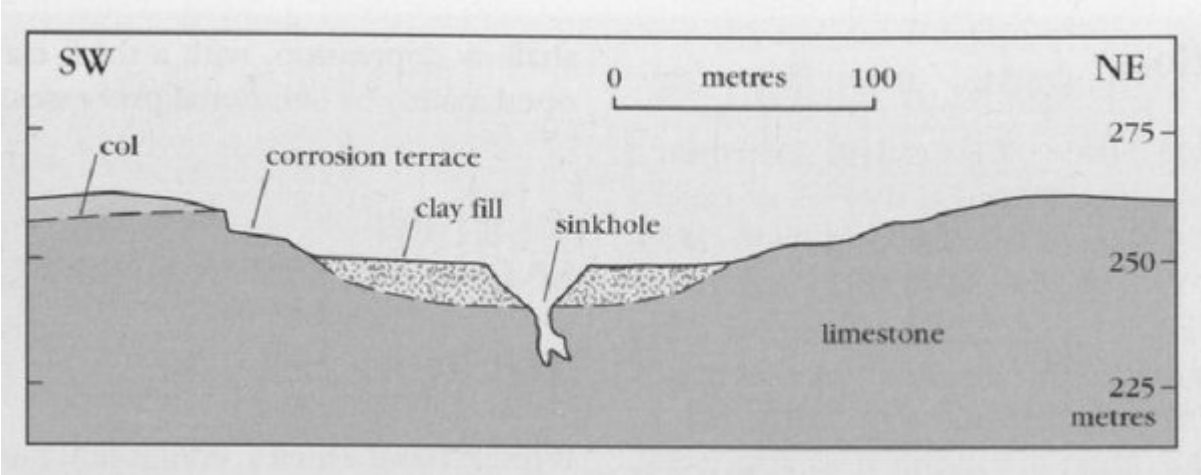
Conclusions

The site covers two of the finest major closed basins on Mendip, in an area of polygonal karst with no intervening valleys. Both basins show evidence of solutional excavation, followed by the periglacial development of lakes and overflow channels, and a return to underground drainage during interglacials.

References



(Figure 5.16) Topographic map of the group of closed depressions forming the zone of polygonal karst on the edge of the Mendip Plateau (after Ford and Stanton, 1968).



(Figure 5.17) Cross-section through the depression and sinkhole of Cross Swallet (after Ford and Stanton, 1968).