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# Wurt Pit and Devil's Punch-Bowl

[ST 559 539], [ST 544 537]

## Highlights

Wurt Pit and Devil's Punch-Bowl are two of the most spectacular subsidence dolines in the Mendip Hills karst. They provide important evidence of the role of subsurface solution, and of leakage of water through impermeable cover rocks, in the formation of dolines on the Mendip plateau.

## Introduction

These two dolines lie on the northern side of the Mendip Hills where the limestone plateau is only partly exhumed from its Mesozoic cover (Figure 5.1). Both Wurt Pit and Devil's Punch-Bowl are collapse dolines developed in the Jurassic Harptree Beds and the Triassic Mercia Mudstones, which overlie the Carboniferous Limestone. In each case, rainwater is concentrated onto a series of seepage paths through the dominantly impermeable surficial rocks, into the limestone at depth, causing solution and collapse, and hence a depression. Their genesis is explained by Smith (1975a) and Barrington and Stanton (1977), and both sites are briefly described by Duff *et al.* (1985).

## Description

Wurt Pit is a cup-shaped doline, 15 m deep and almost 100 m across, set in a gently sloping hillside with no associated valley features (Figure 5.18). It has a sharply defined rim and steep rocky sides. The surface rocks are the silicified limestones and mudstones of the Jurassic Harptree Beds, which are exposed on the walls of the doline. The Mercia Mudstones and Dolomitic Conglomerate are believed to underlie the site at no great depth, and they outcrop nearby. The nearest exposure of the Carboniferous Limestone is 500 m to the south-east; however, limestone is almost certainly present at depth directly beneath the doline.

Devil's Punch-Bowl is another impressive depression, over 50 m in diameter and almost 20 m deep. Like Wurt Pit, it is independent of the local drainage pattern, but it does have a small trench valley into it, and there is usually a small pool on its floor. Mercia Mudstones are exposed in the walls of the depression, and rotted siliceous material exposed in the trench may represent part of the Harptree beds. The Dolomitic Conglomerate and Carboniferous limestone appear in outcrops at distances of around 500 m north, west and south of the doline, and must underlie the site.

## Interpretation

Wurt Pit is an excellent example of a subsidence claim developed in consolidated cover rocks. It was clearly formed by the solution of Carboniferous limestone at depth, followed by collapse and subsidence of the relatively impermeable and insoluble cover rocks (Smith, 1975a; Barrington and Stanton, 1977). The water responsible for the solution could have come from either or both of two sources; it may have been lateral flow entirely within the underlying limestone, but it was almost certainly joined by aggressive surface water leaking down through fissures in the Jurassic cover rocks. If lateral groundwater flow within the Carboniferous limestone was the dominant agent, then Wurt Pit may be more correctly described as a collapse doline.

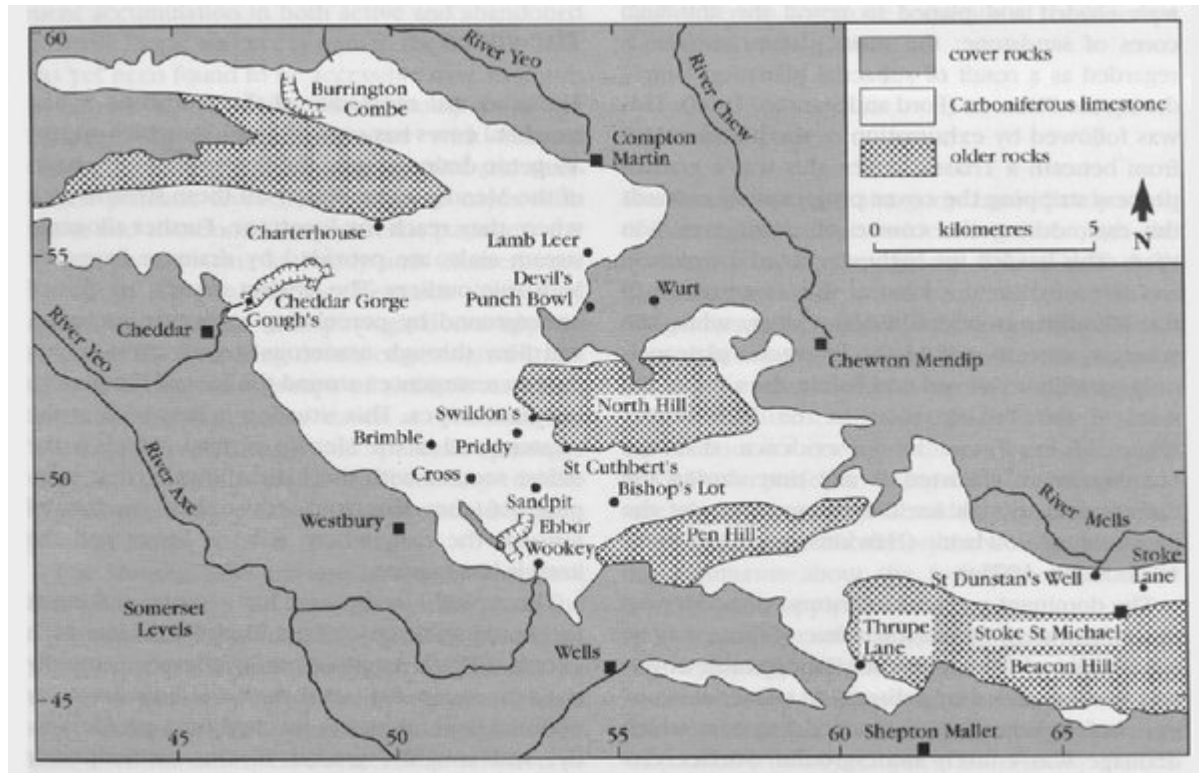
Devil's Punch-Bowl has an origin which is broadly similar to that of Wurt Pit, except that the Mercia Mudstones in which it lies are almost completely impermeable. The ephemeral lake is a consequence of the very low surface permeability, and it drains only very slowly underground, where the morphology of any caves and fissures is unknown. Recent explorations have revealed cave systems beneath Wigmore (Jarratt, 1991; Hughes, 1991) and Attborough swallets, both of which are dolines comparable to the Devil's Punch-Bowl, located a few kilometres to the east. These have stream caves developed in the carbonates of the Carboniferous limestone and the Dolomitic Conglomerate, with active tributary passages and

chambers formed wholly within the Mercia Mudstone. These mudstone caves appear to have developed as piping failures, enlarging progressively headwards, but the seepage flow which causes the piping erosion may have been initiated along calcareous horizons within the Mercia Mudstone. The same processes may be, or may have been, active beneath the Devil's Punch-Bowl doline.

## Conclusions

The site covers two of Mendip's largest collapse dolines, and both are excellent examples of subsurface solution creating surface depressions, aided by leakage and piping through the surficial rocks, irrespective of surface morphology.

## References



(Figure 5.1) Outline map of the Mendip Hills karst, with locations referred to in the text. Cover rocks are mostly the Triassic and Jurassic mudstones and limestones; Upper Carboniferous rocks form the thrustured outlier on the east side of Ebbor Gorge. The Triassic Dolomitic Conglomerate is included with the Carboniferous limestone where it is composed of blocks of the limestone and is an integral part of the karst. Older rocks are the Devonian Old Red Sandstone and the Dinantian Lower Limestone Shale.



(Figure 5.18) The Wurt Pit doline breaks the gently graded surface on the Harptree Beds outcrop. (Photo: A.C. Waltham.)