St Dunstan's Well catchment caves

[ST 657 477], [ST 669 474]

Highlights

The caves of the St Dunstan's Well catchment contain the most abundant, and best preserved, calcite deposits in the Mendip karst. They represent the only significant cave systems in Mendip which can be explored in almost their entirety from sink to rising. Their gently graded profiles in steeply dipping limestone contrast with the looped profiles of caves developed in more gently dipping strata on the southern flanks of the Mendips.

Introduction

The catchment covers a number of caves developed in the Carboniferous Limestone on the northern limb of the Beacon Hill pericline, all draining to St Dunstan's Well (Figure 5.1). Allogenic water drains off the Silurian basalts, Old Red Sandstone and Lower Limestone Shales of the inlier, and sinks at various points as it crosses the karst. The limestone dips north at 50–80°, though the local relief is very subdued. Consequently the caves have little vertical range, none exceeding 50 m in depth. The passages cut across the bedding into successively higher stratigraphic horizons in their course towards the resurgence of St Dunstan's Well, lying at the contact of the Carboniferous limestone with the overlying Namurian Quartzitic Sandstone. The Withybrook Fault passes through the Fairy Cave Quarry area, aligned NNW and dipping 50° west, with a small downthrow to the west; the fault has a brecciated zone, 15–20 m wide, with calcite and ferromanganese mineralization.

The cave systems of the western part of the catchment, in and around Fairy Cave Quarry, were comprehensively described by Price (1977, 1983). Passage descriptions of all of the caves are in Barrington and Stanton (1977) and Irwin and Jarratt (1992). The hydrology and water chemistry were investigated in some detail by Drew (1968, 1970), with further brief comments by Atkinson *et al.* (1973), Drew (1974) and Edwards (1994). Various aspects of the caves and their hydrology have been described and discussed in Smith (1975a).

Description

The western part of the site is centred around the now disused Fairy Cave Quarry which, during its working life, intersected the passages of two major connected cave systems (Figure 5.20) and provided the only known entrances to the caves. More than 4500 m of passages have been recorded, but 800 m of this has since been destroyed by quarrying. The remaining cave fragments opening in the quarry faces have been given separate names.

The western branch of the quarry caves is formed by Withyhill Cave and the connected Hillwithy–Hilliers–Fairy Cave System (Figure 5.20). Withyhill Cave is the largely abandoned, upstream segment of the system, with 740 m of passages. It comprises a single, gently meandering passage with two tributary elements at its upstream end, one reaching close to the sink at Withybrook Slocker. In places a phreatic half-tube is discernible in the roof above a vadose trench, but the original form of the passage is much obscured by collapse and by the profusion of calcite speleothems. These include stalactites, large stalagmite bosses, helic-tites, curtains, gour pools and crystal pools on a scale unmatched by any other cave on Mendip. The downstream continuation of Withyhill is the Hillwithy–Hilliers–Fairy system, with 1200 m of passages entered from Fairy Cave, an old phreatic inlet. The main part of this section is a simple meandering phreatic tube or rift, with a vadose trench discernible in places, now occupied by a misfit stream; there are a few collapse chambers.

It has 2200 m of mapped passages (Figure 5.22), and carries a stream which contributes 75% of the swallet input to the St Dunstan's Well risings (Drew, 1968). This stream flows to the northwest, before turning along the strike near its explored limit. Much of the streamway is a rejuvenated phreatic passage rarely more than 1 m high or wide. It follows a

very gentle gradient, so that dips in the roof level have created six sections of permanently flooded passage; the end of the known cave lies 900 m east of the resurgence at St Dunstan's Well. Above the streamway, a series of small phreatic tubes and rifts link to high-level phreatic chambers, modified by collapse. Some of these chambers are decorated with an abundance and variety of speleothems, including some very large stalagmite bosses. Bone Chamber is the largest, 35 m long and 15 m wide, approaching very close to the surface; it lacks calcite deposits, and its floor is strewn with boulders and mud, containing charcoal and bones which are probably very recent (Tratman, 1975).

Fairy Cave and much of Millers Cave are developed along the strike, and the cave is blocked in a well decorated chamber choked close to the surface, possibly at the site of a former resurgence only 70 m from the present risings.

Shatter Cave, with 1200 m of passages, is the upstream segment of the eastern branch of the main system breached by the quarry (Figure 5.20). It is mainly developed in the fractured limestone adjacent to the Withybrook Fault, and consists of a series of collapse chambers, each up to 20 m across, connected by smaller rifts and bedding plane passages. Abundant speleothems of all types, with notable crystal pools and curtains, are only marginally less impressive than those in Withyhill Cave (Figure 5.21). There is evidence of at least two phases of calcite deposition, as yet undated, with an interval of erosion or disturbance when many speleothems were broken up and re-cemented by later growth. Upstream the passage is blocked by collapse; and the downstream continuation has been largely destroyed by quarrying.

Stoke Lane Slocker is an important swallet cave in the eastern part of the catchment (Figure 5.1).

Interpretation

The importance of these caves lies primarily in the abundance and variety of speleothems which they contain. These are on a scale unmatched elsewhere in Mendip and equalled by only a few other sites in Britain. Investigation of these caves and comparison with other sites notably rich in calcite speleothems may well reveal information on the climatic, topographic and geological factors which influence speleothem development. The dominance of straw stalactites in Pennine caves such as Strans Gill Pot, and the prominence of much more massive stalagmites in Otter Hole at low altitude in South Wales, both stand comparison with the more mixed speleothem assemblages in these East Mendip caves. The contrasts are probably due to geographically dictated climatic and palaeoclimatic differences; more detailed and quantitative study of the speleothems and their geological environments is needed before the implications on palaeoenvironmental reconstructions can be assessed.

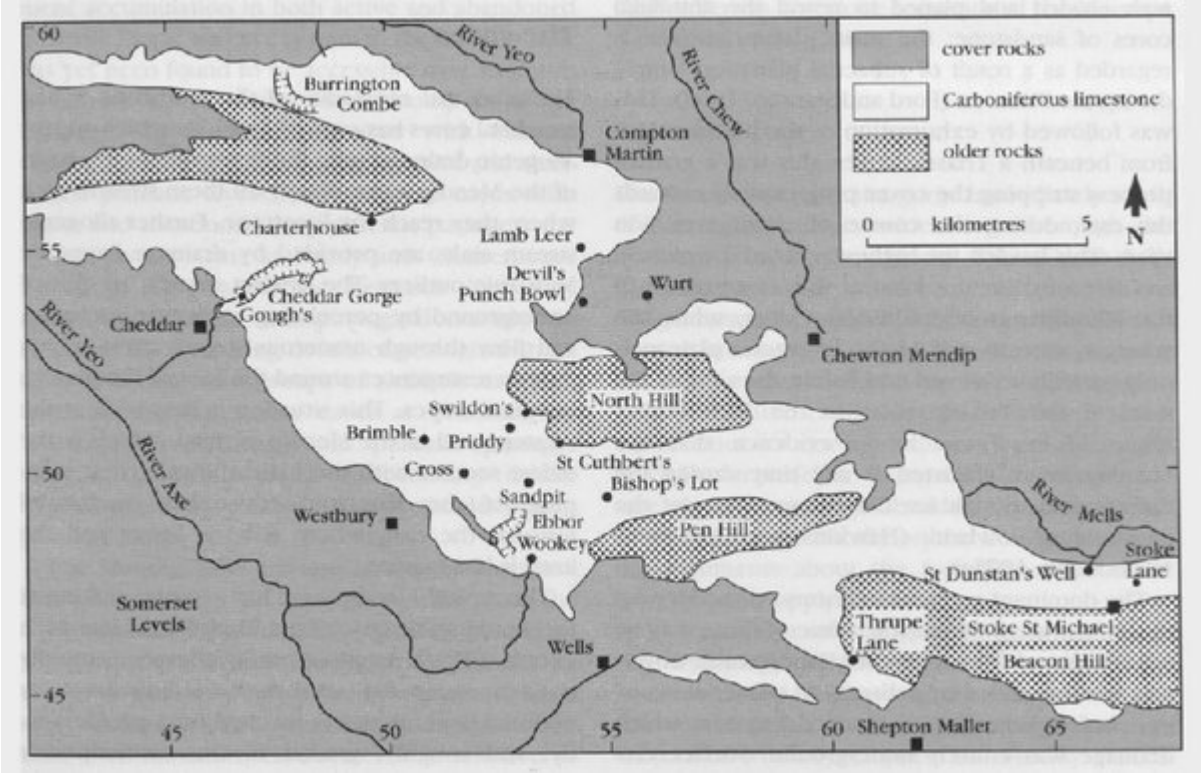
The profiles of these caves presents a significant contrast to those developed in the more gently dipping limestones draining the southern flanks of western Mendip. The Priddy–Wookey and Charterhouse–Cheddar systems are characterized by large phreatic loops developed down the bedding and up joints whereas, despite the much steeper dip of the limestone in the St Dunstan's Well catchment, these caves have gently graded profiles. The fracture density within the limestones has been high enough for the caves to develop on an almost graded profile, without deflection by the bedding planes into deep loops (Ford, 1971).

These caves of eastern Mendip show a sequence of development, from phreatic chambers, followed by phreatic conduits close to a graded profile, and then rejuvenation and modification by vadose erosion, with associated collapse and calcite deposition. This sequence reflects changes in karst drainage associated with landscape evolution through the Pleistocene; absolute dating of the calcite speleothems is required to recognize the time-scale involved.

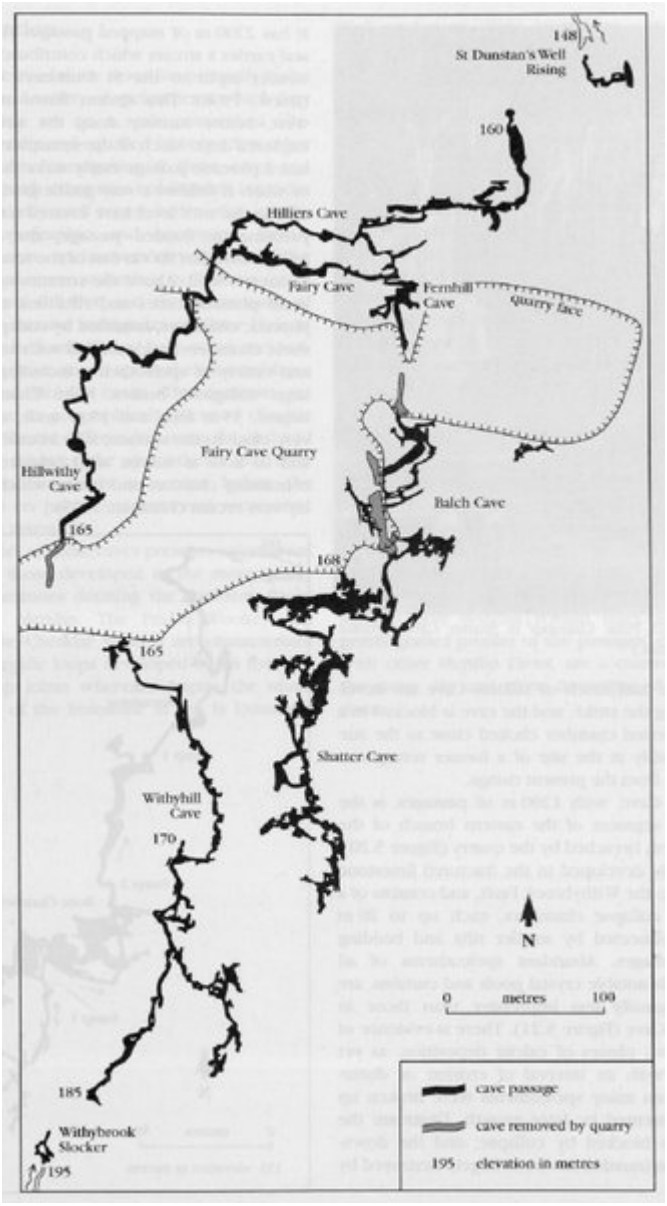
Conclusion

The catchment contains the accessible fragments of three cave systems, all of which are notable for the exceptional profusion, variety and beauty of their calcite speleothems. The caves can be explored over almost their full length from sink to rising, whereas the middle reaches of most other Mendip cave systems remain inaccessible. The gently graded profiles of the passages, contrasting with other Mendip caves, are a consequence of the steep dip and close fracturing of the limestone.

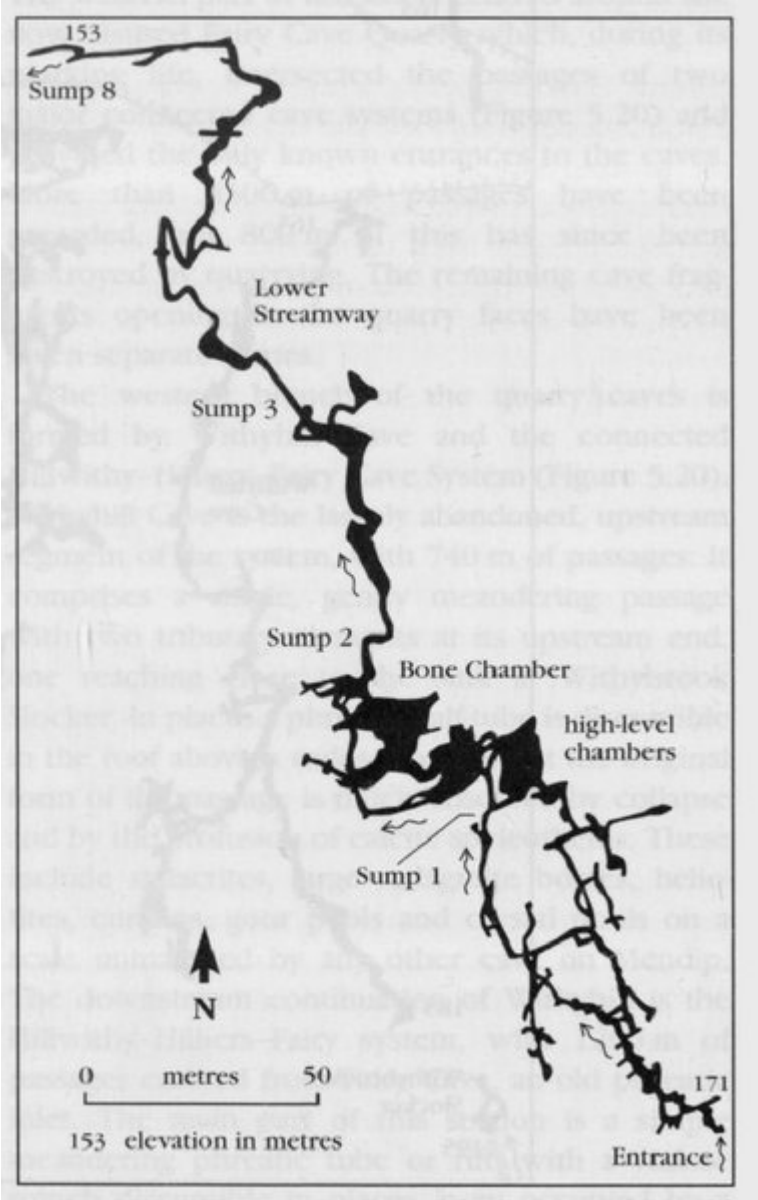
References



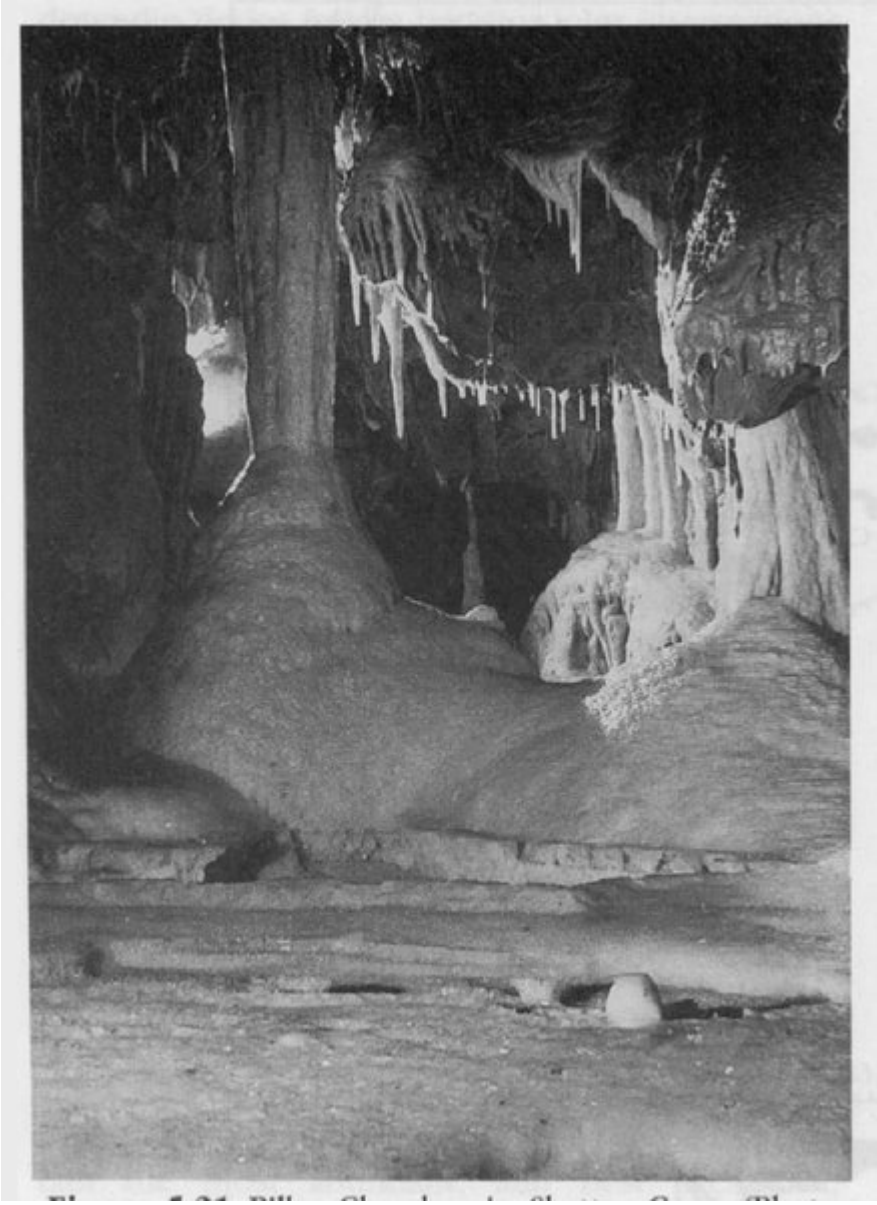
(Figure 5.1) Outline map of the Mendip Hills karst, with locations referred to in the text. Cover rocks are mostly the Triassic and Jurassic mudstones and limestones; Upper Carboniferous rocks form the thrusted outlier on the east side of Ebbor Gorge. The Triassic Dolomitic Conglomerate is included with 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 5.20) Outline map of the cave systems revealed where the Fairy Cave Quarry cut into the limestone outcrop (from survey by Cerberus Caving Club).



(Figure 5.22) Outline map of Stoke Lane Slocker (from surveys by Wessex Cave Club and Cave Diving Group).



(Figure 5.21) Pillar Chamber in Shatter Cave. (Photo: A.C. Waltham.)