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# Slaughter Stream Cave

[SO 582 137]

This is a proposed GCR site, not yet designated as an SSSI

## Highlights

An underground catchment area is contained in the plunging Worcester Syncline, where modern cave drainage converges on the axial zone and flows to the Slaughter Rising. Active and abandoned passages, within the Slaughter Stream Cave and adjacent caves, show strong stratigraphical and structural guidance of their origin and development. Palaeokarstic features, including conduits partially infilled by Triassic iron ores, and abandoned caverns containing mammalian bones, provide evidence of a long and complex history of cave development.

## Introduction

The Slaughter Rising lies on the eastern bank of the River Wye, south of Symonds Yat (Figure 7.2), and gathers allogenic input from sinkholes as far apart as Coldwell Swallet, Whippington Brook Swallet and Hoarthorns Wood Swallet (Figure 7.2). It is the resurgence for nearly all the underground drainage which gathers in the Worcester Syncline, an arm to the north-west off the Forest of Dean basinal structure. Most of the feeder swallets have developed where water runs off the cap of Holkerian Drybrook Sandstone, and down through fissures in the Arundian Whitehead Limestone and the Chadian Crease Limestone, each about 25 m thick. The main cave passages are developed in the underlying Courceyan Lower Dolomite, which is about 70 m thick. Coldwell Swallet lies in the Crease Limestone as the Whitehead is overstepped by the Coil Measures. The Slaughter Stream Cave is the most extensive cave known within the catchment. Its 12 km of mapped passage are only a small part of the total network behind the Slaughter Rising; cave passages on both flanks of the Worcester Syncline include high-level remnants and the active drains, all forming parts of an ancient system which is still evolving.

The catchment of the Slaughter Rising was defined by a series of dye tests carried out by the local caving clubs (Standing, 1967; Solari, 1974; Lowe 1989a). Subsequently the cave passages were explored beneath Wet Sink (now known as Slaughter Stream Cave) and Redhouse Swallet (Clark, 1991; Taylor, 1993). Stratigraphical control of the cave geomorphology demonstrates the important role of inception horizons (Lowe, 1992b, 1993) and also the links with the palaeokarst and hematite deposits widespread in the Forest of Dean limestones (Trotter, 1942; Welch and Trotter, 1960).

## Description

The only access to the Slaughter Stream Cave (Figure 7.2), most of which lies under the impermeable cover, is through immature fissures beneath Wet Sink, into a series of shafts and narrow rifts which meets the Main Stream Passage 52 m below the entrance. Downstream the passage is generally 2 m wide and up to 4 m high, but the stream is lost into flooded passages south of an overflow route through unmodified, partly sand-filled, solutional tubes. There are two inlet passages from the east; both are series of narrow canyons and rifts, of which Pirate Passage reaches over 1800 m. The stream is rejoined beyond its flooded section, and Echo Passage is another inlet with water emerging from a choked sump. The lower streamway is up to 15 m high, with walls in heavily corroded rock. A canyon develops in the floor of a wider phreatic roof passage, until the stream is again lost into flooded bedding planes. A primitive bedding passage at roof level continues above the sump, and turns north-east into Kuwait Passage. This long rift is 2 m wide, with black walls and white calcite formations, but becomes narrower after 1000 m, where a small streamway is met, and the current end of the cave is a static sump.

Upstream from the entrance series, Zurree Aven leads up into extensive upper passages. Abandoned passages lead into the Chunnel, which continues 10 m wide and 6 m high westward into a complex of rifts and chokes. Kiln Passage is an

inlet with about 500 m of twisting canyon, ending near the surface excavation of Kiln Hole. The Three Deserts Series continues to the west and into Dog's Grave Passage. At low level, an abandoned streamway leads to a high rift with large crystals on its walls. The upper passage continues as a large tunnel to Helictite Rift, well decorated with helictites and dripstone of white calcite; this continues over a stream which is covered by a calcite crust. A short, choked passage leads over white calcite flakes into the Snow Garden, a high, narrow streamway with a white calcite floor. Flow Choke Passage is a series of abandoned rifts northwest from the Three Deserts into a major abandoned streamway, 10 m high, continuing in a straight line to a choke cemented by calcite flowstone.

The 12 km of mapped passages in the Slaughter Stream Cave cover a vertical range of 99 m. They include a magnificent active vadose streamway cut beneath a primitive phreatic route, as well as several, abandoned drains modified by vadose trenches. Abandoned passages contain thick beds of sand and silt, with sedimentary structures including ripple marks, and parts of Kuwait Passage and Helictite Rift contain very fine calcite formations. The cave contains an unusual number of mammalian bones, which have fallen or been washed in, or have been relocated by stream activity. The streamway contains bones of a hippopotamus, at least 125 000 years old. The Graveyard in the high levels near the Chunnel contains bones of domesticated species, and possibly human remains, and an auroch bone (2000–3000 years old) was found in a nearby passage. The skeleton of a dog in Dog's Grave Passage, and associated tracks in a nearby oxbow passage, present a mystery with regard to the animal's route into the system.

North-west of Wet Sink, a major stream is swallowed in a blind valley near Redhouse Lane, where over 2000 m of cave is now known in Redhouse Swallet (Figure 7.2). A series of narrow rifts, originally choked with sediment and boulders, drops about 30 m into the main stream passage. Downstream, this passage is of varied morphology, with deep canals, high rifts, collapse zones and abandoned loops over flooded sections; it ends in a choke over a flooded rift. The Fossil Series has a small inlet stream and several large chambers, including Bowen Chamber with its thick clastic deposits, and Missed Chamber.

## Interpretation

The caves of the Slaughter catchment demonstrate the role of inception horizons, where chemical contrasts within the carbonate sequence have created specific stratigraphic horizons favourable to solution and cave development. These inception horizons are features of the host rocks, and the cave inception may be traced back to a limited scale of cavity opening soon after the limestones were formed, long before the caves were greatly enlarged by drainage beneath more modern landscapes (Lowe, 1992, 1993).

Though exploiting fissures locally, the main drain and its tributaries in the Slaughter Stream Cave are cut beneath a bedding-guided solutional conduit, segments of which survive unmodified where drainage is captured by fault-guided short-circuits. Drainage in both the Slaughter and Redhouse cave systems initially flows away from the rising, maintaining a constant horizon and following local hydraulic gradients south-westwards into the trough of the Worcester Syncline (Figure 7.2). Stratigraphical guidance was crucial to underground conduit growth, but fracture guidance was important locally, where joints facilitate minor conduit sidestepping within the same horizon. Faults may be involved in offsetting and linking zones of stratigraphical guidance, but it is unconfirmed whether the major linear rifts, including Kuwait Passage, follow fault planes.

Superimposed across the Worcester Syncline is a series of gentle, asymmetrical folds whose axes plunge towards the main fold trough (Figure 7.2). These minor folds have fundamentally influenced the direction of past and present underground drainage. The modern drainage collects in the main syncline and then escapes by upward leakage through fissures to the impenetrable Slaughter Rising. It is unknown if the main cave conduits behind the rising are deep in the Lower Dolomite, at the stratigraphic level of the Slaughter Stream Cave; alternatively, they may lie in the Crease or Whitehead Limestones downstream of phreatic lifts from the known caves.

The earliest speleogenesis in the area probably predated the downcutting of the Wye, by many millions of years. A pre-Triassic maturity is likely, and inception activity commencing during the Carboniferous is a realistic possibility. The relationships of abandoned high-level passages to the active drains and to nearby relict cave fragments are yet to be elucidated, but the abandoned high-levels, of Flow Choke and Dog's Grave Passages, may once have carried drainage

away from the River Wye, eastwards into the groundwater reservoir of the Forest of Dean basin. If this was so, these drains must have been conceived before the Wye incised its valley and captured the karst drainage during the late Tertiary. Whether the trunk passages in the main caves were contemporary with the passage segments truncated in the sides of the Wye Valley is unknown. The clastic sediments could provide the evidence; these may reflect a temporary engulfment of part of the proto-Wye during incision, or may have been deposited in pre-existing tunnels cut before the incision. It has been suggested that the Wye Valley relict caves formed before iron ore emplacement in the Triassic period, and some clastic sediment may be of late Triassic age (Lowe, 1993). Large chambers in Symonds Yat and Cross Joints Swallets were formed by solution of the Crease Limestone and collapse of the overlying beds. These resemble the voids in the local iron ore mines, where high-grade ore was removed from the host bedrock (Lowe, 1989, 1993).

Existing phreatic conduits, and any less well developed parallel or tributary routes of the same age, were drained following uplift, and then carried underfit vadose streams. After uplift, phreatic flow continued at lower levels, along fissures and inception routes that were conceived and partially developed before the uplift. Development of these lower routes was by the underflow which they carried along their own favoured hydraulic gradients, which need not have mirrored the hydraulic gradient favoured by simultaneous flow at higher levels. In the Slaughter Stream Cave, deep underflow continued, probably augmented by fissure leakage from underfit streams in the overlying primary conduits. As the Wye cut through the Worcester Syncline, favourable inception horizons in the aquifer were exposed first on the northern and southern fold flanks, and later in the fold core. With the breaching of each stratigraphic horizon in the fold core, a potential spring site was exposed and offered hydraulic gradients more advantageous than those towards more distant outlets.

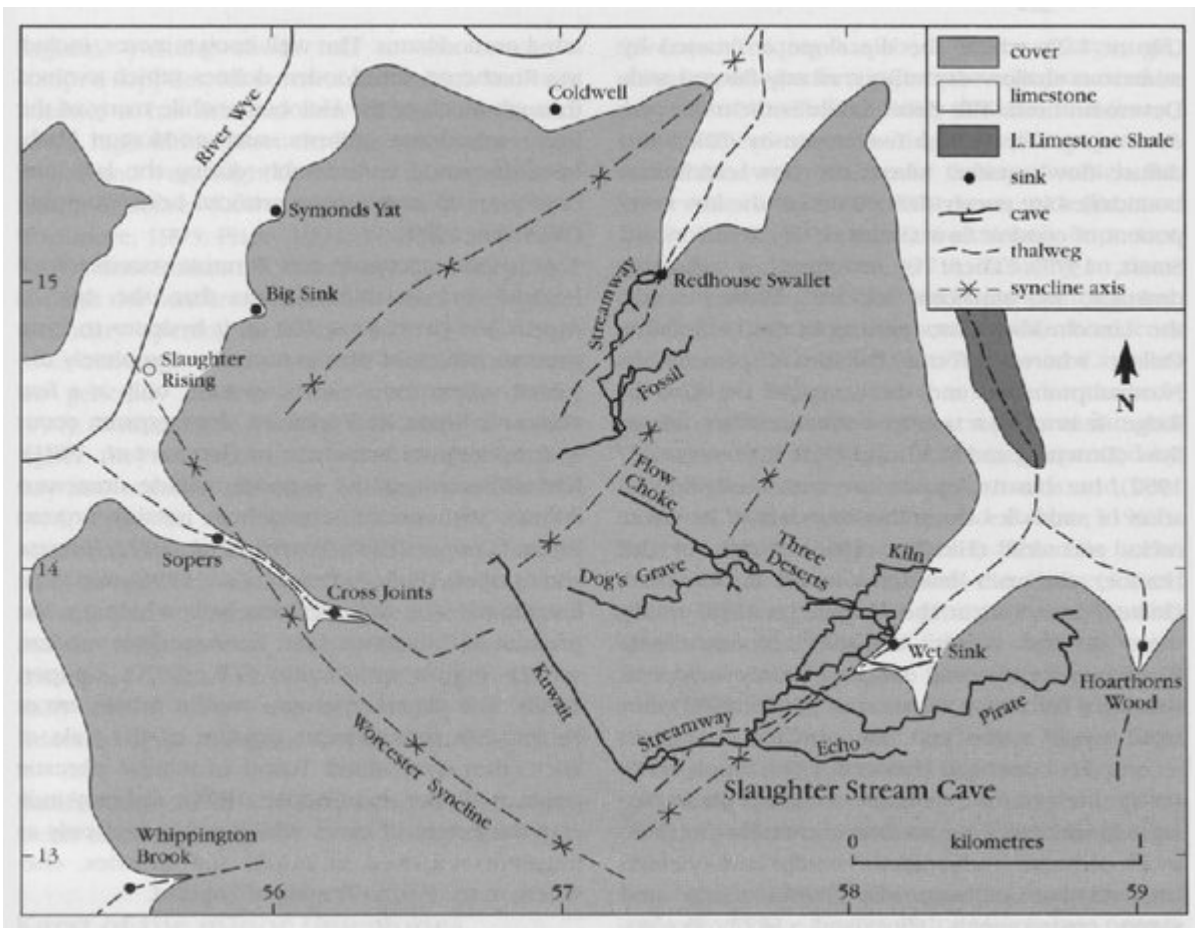
Whether the high-level routes were imprinted within their guiding horizons before or after the minor fold ripples formed across the limbs of the Worcester Syncline is unknown. However, after downcutting and rejuvenation, these minor synclinal troughs offered a means of turning vadose drainage away from its regional, eastward trend and towards the advantageous westward route along the Worcester Syncline. In the Slaughter Stream Cave the roofs of the Main Streamway and its tributaries are at a constant horizon, close to the axis and across the limbs of a minor syncline. Redhouse Swallet lies in another syncline, and more parallel independent drains may exist in the other synclines where the drainage direction changes beneath abandoned high-level passages.

The presence within Slaughter Stream Cave of bones, animal tracks and ancient man-made detritus indicates that other surface connections have existed in the past. Some detritus, and bones of butchered domesticated species, may have been 'tipped' into shafts or active collapses at the surface, eventually to enter the cave. Other debris, of wild and domesticated species, might have been washed in, though this would have required sinks far more open than those which were excavated to give the modern access. Other bones, and local guano deposits, indicate that bats and small rodents have occupied the caves, but how they entered the caves is unknown. Most intriguing are the tracks and skeleton found in Dog's Grave Passage, which lies far beneath the impermeable cover remote from any sinkhole sites. It is difficult to imagine how the animal gained access, either uninjured or sufficiently uninjured to move around until its eventual death.

## **Conclusions**

The underground catchment of the Slaughter Rising is a karst of synclinally folded carbonates whose stratigraphy and structure have guided the inception and development of a long and complex cave system. Among the known cave passages and chambers, there are elements which were well developed before late Triassic times. Underground drainage directions have changed radically during this long history, largely in response to the deepening of the Wye Valley, but possibly due partly to the earlier effects of tectonic deformation. Traces of animals preserved in the caves indicate that their recent history includes further significant changes.

## **References**



(Figure 7.2) Outline map of the caves in the catchment of the Slaughter Rising. The cover rocks are the Drybrook Sandstone and the Upper Coal Measures. All the sinks marked on the map have been dye traced to the Slaughter Rising (from survey by Royal Forest of Dean Caving Club).