# Porth-yr-Ogof

## Highlights

Porth-yr-Ogof is a spectacular river cave, with the main conduit accessible from sink to resurgence. It is a fine example of underground capture of surface drainage and of the initial stages of development of a river gorge through cavern collapse.

## Introduction

Porth-yr-Ogof lies in the floor of the Mellte Valley, south of Ystradfellte (Figure 6.1). Several streams drain south from the Old Red Sandstone slopes to converge near Ystradfellte, before crossing onto the lowest beds of the Carboniferous Limestone dipping south at about 4°. In dry weather, the water all flows underground into massive limestone at the impenetrable Church Sink. In flood conditions, a surface stream continues south for a further 600 m to enter the Main Entrance of Porth-yr-Ogof at the end of a short limestone gorge. The entire cave is developed near the top of the Holkerian Dowlais Limestone. After 300 m underground, the river resurges through a deep pool, 700 m upstream of a fault which crosses the valley at the end of the limestone outcrop. A shallow rocky ravine lies almost directly above the cave; it is permanently dry and its floor is breached by a collapse into the main cave passage.

The cave and its geomorphology have been described and discussed by Standing and Lloyd (1970), Lloyd (1980) and Waltham and Everett (1989), and the Mellte hydrochemistry was discussed by Groom and Williams (1965).

## Description

Porth-yr-Ogof has nearly 2500 m of passages within a very small area and reached by fifteen entrances (Figure 6.11). These include the main river entrance and exit, a number of incidental joint fissures and three roof collapses towards the resurgence. The Main Entrance is 15 m wide with a shallow arched roof into a wide bedding plane chamber, with the river in a trench between wide rock shelves (Figure 6.12); it lies at the lower end of a short gorge between vertical limestone walls. Inside the cave, the Mellte flows in a wide passage with numerous oxbow loops at water level. The Great Bedding Cave is up to 30 m wide, with shallow pools and shingle banks spanned by an unbroken limestone slab beneath a gently dipping bedding plane. Downstream the passage narrows into the joint-guided resurgence rift. The baseflow of the Mellte enters Church Sink and drains into the flooded tubes and rifts which are the active part of the Upstream Series. The whole cave is distinguished by the braided form of its passages, with numerous loops extending in the bedding planes on both sides of the main drainage path. These are particularly complex on the western side, where passages on two bedding planes are connected by small shafts in the Maze. Cwm Porth Inlet is a flooded tributary on the east side, probably gathering water from small sinks along the limestone boundary (Burke, 1967). Hywel's Grotto is an old distributary on the west side, now decorated with calcite speleothems.

## Interpretation

Passage morphology throughout Porth-yr-Ogof is closely controlled by the bedding planes and fractures within the massive limestone, though the effects are masked on the cave map (Figure 6.11) by the braiding on the major bedding planes. The main passages are formed on four bedding planes, each separated by limestone beds about 1 m thick. These are all exposed in the Main Entrance and first chamber, and are most conspicuous where the second from the top forms the wide roof span of the Great Bedding Cave. This wide cave survives where the limestone beds are less fractured. The main joints are aligned NNW and NNE, controlling the rift passages around the resurgence and in the Upstream Series, and the collapse entrances at the lower end of the Great Bedding Cave. Where they are more densely packed, they have allowed more roof collapse to form the gorge upstream of the Main Entrance.

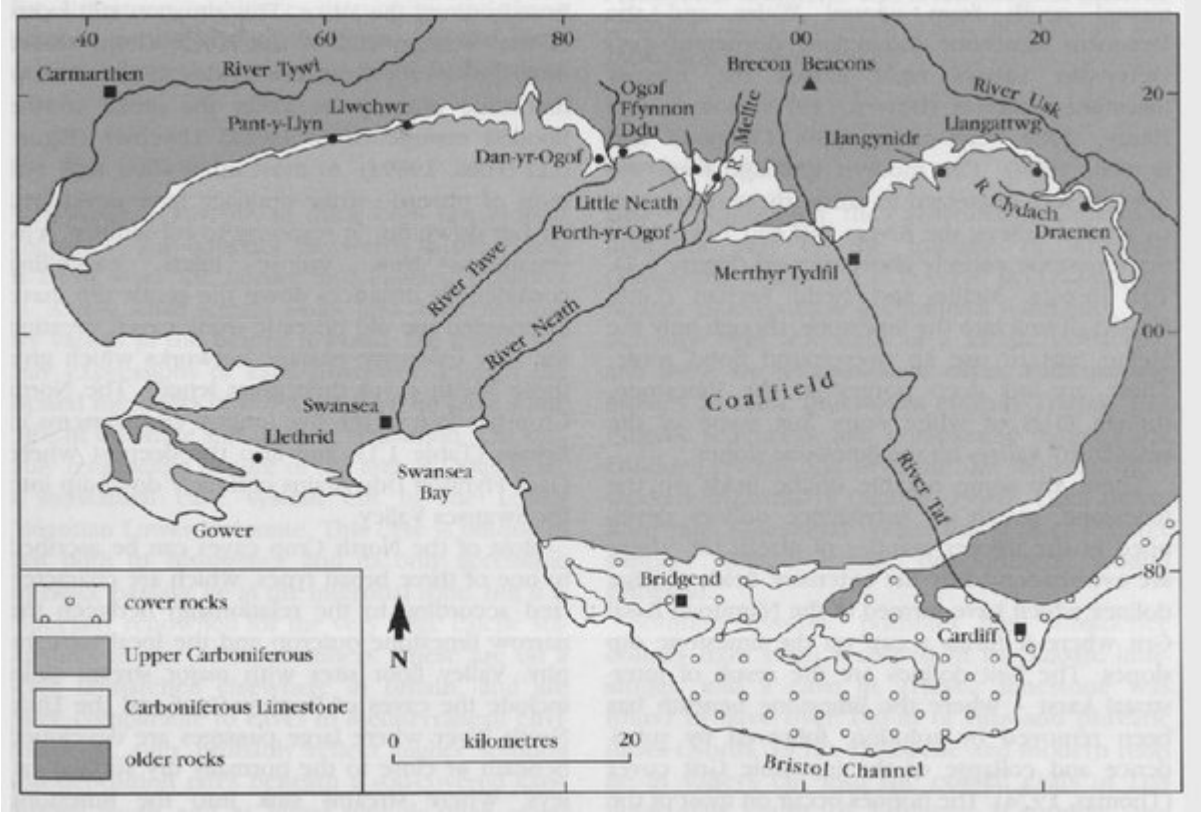
Initial development of the cave was by phreatic solution opening up fracture routes through the limestone beneath the river bed. Aided by the steep gradient of the rejuvenated Mellte (North, 1962) and the hydraulic continuity within the four dipping bedding planes, the karstic conduits were soon large enough to take the entire flow underground. A short phreatic lift at the resurgence was removed due to incision by its overflow, and the whole cave was then further enlarged in a vadose environment. Evolution has now reached a stage where the upstream end of the cave is being progressively unroofed to create the upstream gorge. Adjacent to this, the cycle is restarting where renewed underground capture is developing in the Upstream Series, which is still largely within the phreas and cannot yet take flood flows.

The gorge upstream of the Main Entrance represents the finest example in Britain of gorge incision by progressive roof collapse downstream from an influent cave entrance; unroofing of the cave is also progressing on a small scale where the old dry ravine is collapsing into the river cave beneath.

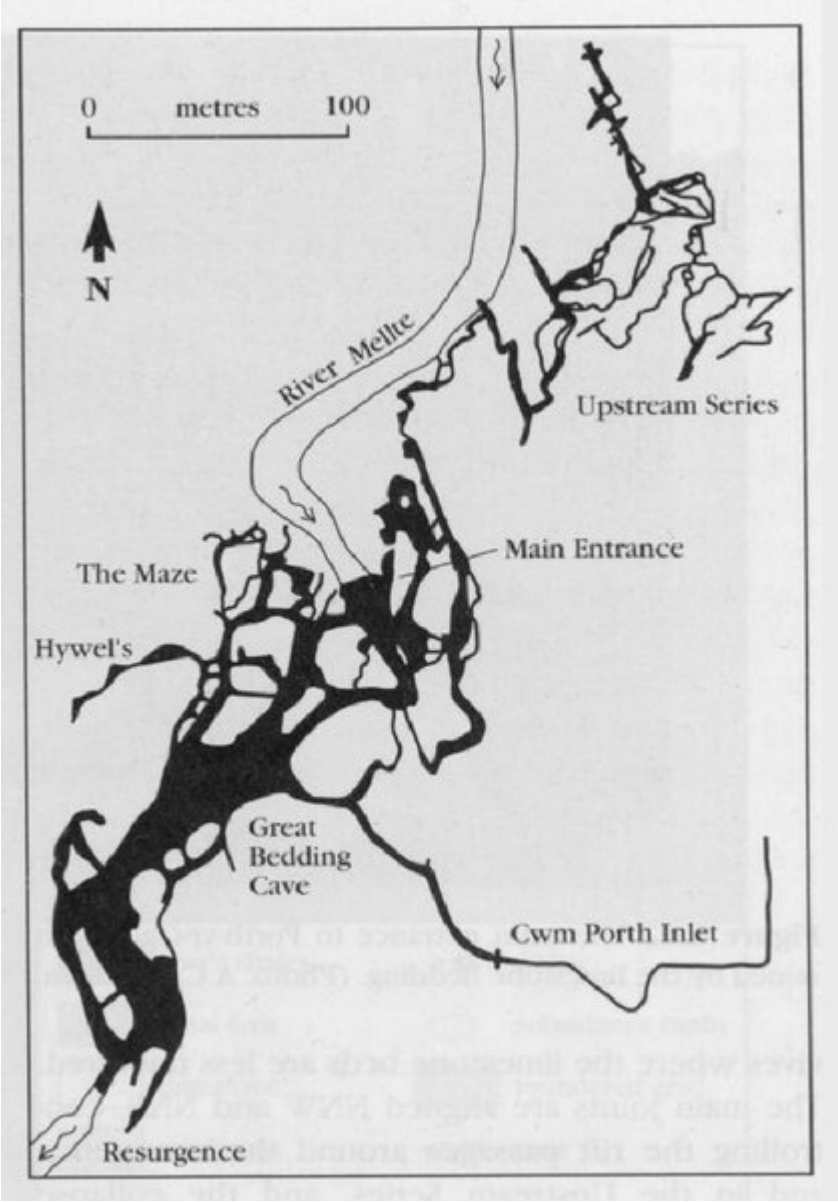
## Conclusion

Porth-yr-Ogof is Britain's finest example of a completely vadose river cave in a valley floor environment. It may be compared with valley floor caves in Nidderdale, Chapel le Dale and the Alyn Valley, but its morphology is far more diverse. It shows every stage of underground capture, from early phreatic fissure enlargement through to collapse and transformation into a sub-aerial gorge. Within the cave, the wide roof spans in single limestone beds are particularly spectacular and are unmatched elsewhere in Britain.

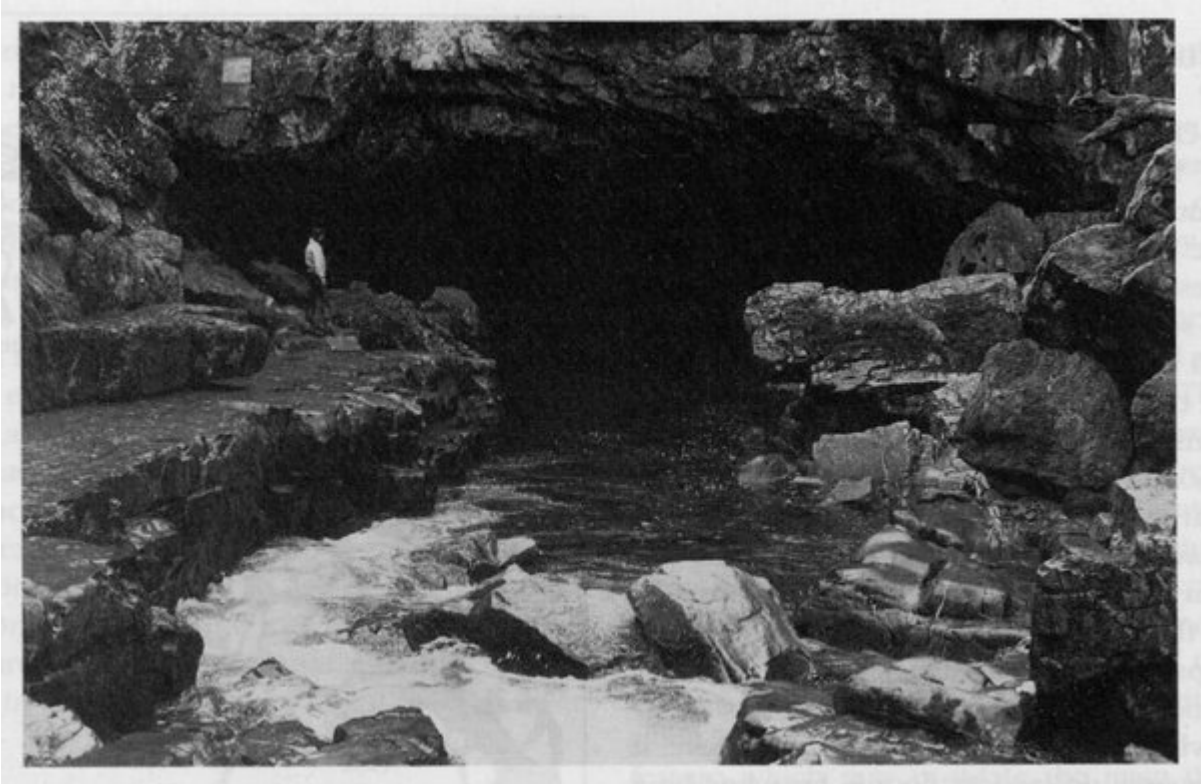
**References**




*(Figure 6.1) Outline map of the karst areas around the perimeter of the South Wales coalfield, with locations referred to in the text. The cover rocks in the south are Triassic and Jurassic mudstones and thin limestones.*




*(Figure 6.11) Outline map of Porth-yr-Ogof (from surveys by University of Bristol Speleological Society and Cave Diving Group). The dry valley between the sink and resurgence lies almost directly over the largest cave passages.*



*(Figure 6.12) The main entrance to Porth-yr-Ogof with the River Mellte flowing in between rock terraces determined by the limestone bedding. (Photo: A.C. Waltham.)*