Buckfastleigh caves

[SX 743 666], [SX 748 678], [SX 735 652]

Highlights

The Buckfastleigh caves are the most extensive in England which are developed in pre-Carboniferous limestones.

Introduction

A series of caves lie in separate outcrops of structurally complex, Middle Devonian limestone in the valleys of the River Dart south-east of Dartmoor in Devon (Figure 1.2). The largest of the caves are beneath Church Hill on the outskirts of Buckfastleigh, but significant other caves are at Pridhamsleigh and further west in the Dean Valley. Many of the cave passages and aspects of their geomorphology have been described by Hooper (1956, 1960), Vowler (1980) and Neill (1988).

Description

The Devonian limestones occur mainly as a series of reefs within clastic formations; they now have very dispersed outcrops, due to the reef distribution and the subsequent folding, faulting and thrusting. Regional metamorphism has left them in a slate sequence; the carbonates are known locally as marbles, but the limited recrystallintion has not destroyed their many fossils. In places the limestones contain interbedded volcanic ash and are cut by small lamprophyre dykes.

The most extensive caves lie in Church Hill, Buckfastleigh, which is a small limestone outlier partly underlain by thrust planes. The system of Reed's Cave and Baker's Pit extends through most of the hill to entrances in quarries on opposite flanks (Figure 7.3). Though contained, within an area of less than 4 ha, the caves have been surveyed to a total length of more than 3000 m, as they form an intricate maze on several levels though some of the length is within complex collapse areas. Most passages are small in cross-section, except where they open out into chambers which survive between the zones of collapse. Some of these chambers contain small, well-preserved calcite and aragonite deposits. Several other small caves within the hill are not connected to the main system, but contain important calcite and clastic deposits. Joint Mitnor Cave (Figure 7.3) contains one of Britain's richest Ipswichian mammalian bone deposits (Sutcliffe, 1960). The smaller caves in the Higher Kiln Quarry are important bat sanctuaries.

Pridhamsleigh Cavern contains more than 1000 m of passages. The relict parts of the cave include chambers up to 30 m wide connected by complex series of solution tubes and bedding plane passages. These contain considerable quantities of mud, with minor calcite and aragonite deposits.

Beneath the relict levels lies an active phreas, with several levels of development leading off a flooded shaft more than 40 m deep, in which stalagmites have been observed at a depth of 12 m. A large chamber, Pridhamsleigh II (Mulholland, 1992), lies within the flooded zone, which is hydrologically linked to the adjacent River Ashburn, with water levels in the cave fluctuating by up to 10 m in response to rainfall.

The small group of caves in the Dean Valley includes Bunker's Hole and Potter's Wood Cave. These consist mainly of phreatic chambers which have been intersected by small vadose streamways, and are notable for their range of mineral deposits, including goethite, with spectacular calcite helictites and aragonite crystals growths.

Interpretation

The caves of South Devon are largely phreatic in origin, and their morphology exhibits significant influence by faulting and vein mineralization within the limestone. There has been only limited vadose modification. The multi-level sequence of active and abandoned caves may be correlated with phases of valley incision and terrace formation in the Dart Valley,

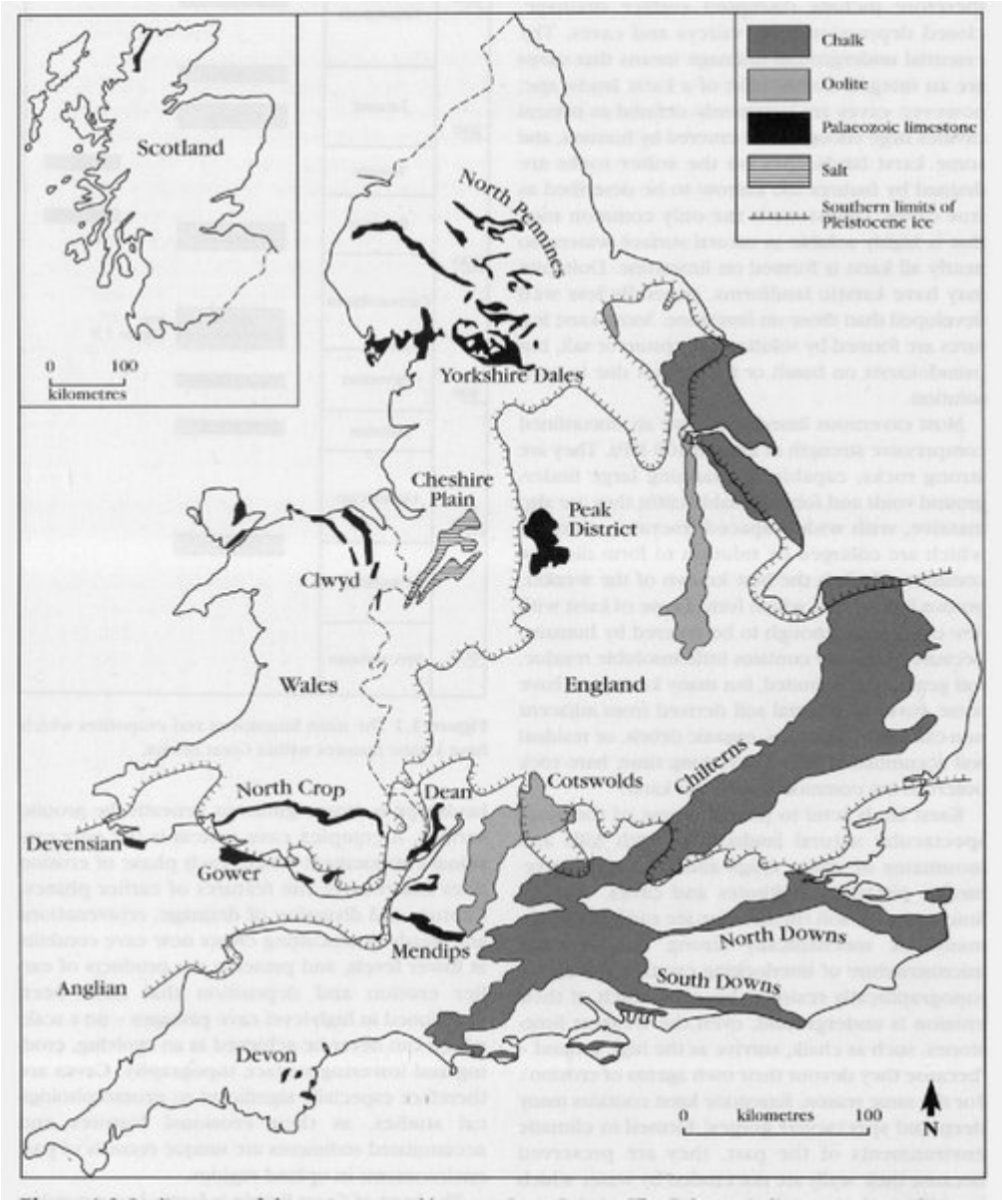
through at least the later parts of the Pleistocene. The speleothems 12 m below the present water surface in Pridamsleigh Cavern indicate that valley floor aggradation has caused a rise in the water table subsequent to the valley incision which had earlier drained most of the caves. The sediment and speleothem sequences within the caves may enable a more detailed chronology to be constructed through this interval, while the submerged speleothems may provide valuable data on sea-level fluctuations during this time.

The bone deposits of Joint Mitnor Cave contain remains of elephant, hippopotamus, lion, hyaena, deer and fox within an assemblage richer in species than any other Ipswichian deposit in Britain. The fauna is indicative of a warm environment when the bones accumulated as a pit-fall deposit, forming a debris cone beneath a shaft which was open to the surface.

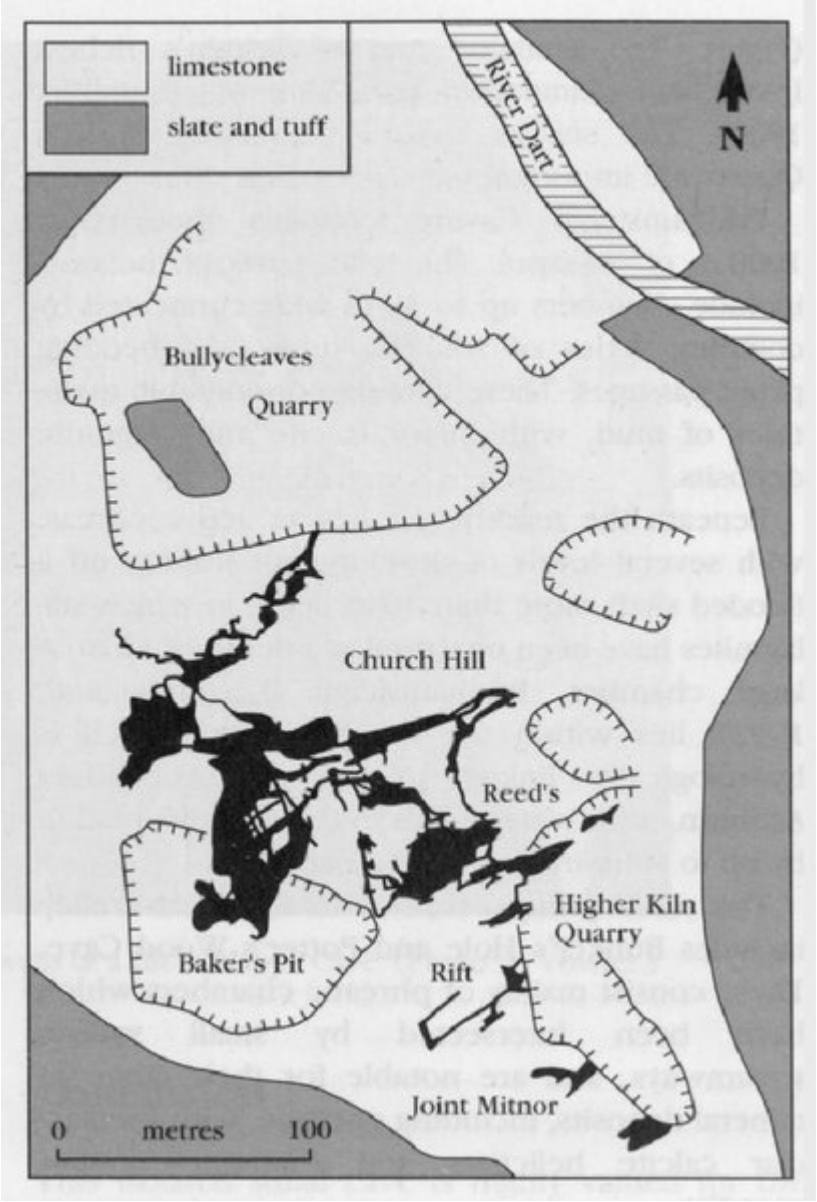
Conclusion

The small and complex cave systems are the longest which are developed in the Devonian limestones. They show multi-level development related to downcutting and then aggradation in the adjacent valleys of the River Dart during the Pleistocene. One cave contains an unequalled interglacial assemblage of mammal bones, and the secondary carbonate mineralization is notable for including aragonite.

References



(Figure 1.2) Outline map of the main areas of karst in Great Britain. The Palaeozoic limestones are of Lower Carboniferous age, except for the Devonian limestone in Devon, and the Cambrian–Ordovician limestone in Scotland.



(Figure 7.3) Outline map of the caves of Buckfastleigh (from surveys by Devon Speleological Society).