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# Joint Mitnor Cave

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## Highlights

Joint Mitnor Cave has yielded one of the richest fossil assemblages of Ipswichian age yet known in Britain. Much of the fossiliferous deposit is preserved *in situ*.

## Introduction

Joint Mitnor Cave is one of several caves opening into the disused Higher Kiln Quarry, at Buckfastleigh in Devon. Although long known as a cave, it was discovered to contain bones in 1939, and was named after W. Joint, W. Mitchell and F.R. Northey. Three main deposits can be distinguished in the cave: 1. a basal, unfossiliferous waterlain deposit; 2. an overlying, highly fossiliferous cave earth, which has yielded a profusion of mammal bones and teeth characteristic of the Ipswichian Stage; and 3. a capping stalagmitic floor. The deposits were excavated between 1939 and 1941 by A.H. Ogilvie and other members of the Torquay Natural History Society (Anon., 1948), and most of the finds now lie in the Torquay Natural History Society Museum and in the British Museum (Natural History), London. A permanent demonstration section of the deposits, with bones *in situ*, has been preserved at the site. The fauna was reexamined in detail by Sutcliffe (1960) and Sutcliffe and Kowalski (1976), and the site has been referred to widely in regional and national syntheses of Pleistocene history (e.g. Sutcliffe, 1969, 1974, 1977; Macfadyen, 1970; Stephens, 1973; Cullingford, 1982; Stuart, 1982a, 1982b, 1983, 1995).

## Description

Joint Mitnor Cave [SX 744 665] is part of a large cave system which has been intersected by two large quarries, Baker's Pit and Higher Kiln Quarry, excavated close to Buckfastleigh Church. The system includes Baker's Pit Cave (opening in Baker's Pit), and Reed's Cave, Disappointment Cave, Rift Cave, Spider's Hole and Joint Mitnor Cave — the latter all opening into Higher Kiln Quarry. The system contains over 2100 m of passages lying between c. 61–82 m OD (Sutcliffe, 1960, 1977; Macfadyen, 1970). The caves lie some 250 m to the west of the River Dart which flows in a generally south-east direction at a level of c. 40 m OD. The river is bordered by a low terrace, and has a well-developed terrace on the east bank at c. 60 m OD and another on the west bank at c. 90 m OD (Sutcliffe, 1977).

Joint Mitnor Cave, which extends only about 20 m from the disused quarry face, lies in faulted and jointed Devonian limestone, and the cave system is underlain by a basin-like deposit of green volcanic tuff (Sutcliffe, 1977). Access to the cave is via the disused Higher Kiln Quarry which now houses the William Pengelly Cave Studies Centre.

Sutcliffe (1960) recorded the following stratigraphy from Joint Mitnor Cave:

3. Stalagmite floor, shattered and partly re-cemented (up to c. 0.5 m);
2. Loosely packed earth and stones, with numerous mammalian remains (cave earth and breccia) (up to c. 1.5 m);
1. Sterile waterlain sediments, much disturbed and locally consisting of finely laminated clay and silt (up to c. 1.5 m).

Sutcliffe (1960) notes that deposits similar in composition and texture to those in bed 1 were encountered in each of the trial pits excavated within Joint Mitnor Cave, as well as in similar locations elsewhere within the cave system, particularly within Baker's Pit Cave. Locally, these deposits are brecciated and overlie bedrock which shows no sign of speleothem growth; their maximum altitude is consistently at c. 64 m OD (Sutcliffe, 1960). Bed 2 is recorded as being thickest beneath the boulder-choke at the highest point of the Entrance Chamber, but thinning to < 0.3 m near the cave entrance. Sutcliffe describes this highly fossiliferous deposit as part of a talus cone, similar cones occurring elsewhere within the

cave system. He notes that numerous waterlain pebbles occur in both beds 1 and 2, some having originated from Dartmoor.

Sutcliffe (1960) and Sutcliffe and Kowalski (1976) recorded the following mammalian remains from the cave earth/talus cone (bed 2) (nomenclature updated):

## MAMMALIA

### Lagomorpha

*Lepus* sp., hare

### Rodentia

*Arvicola terrestris cantiana* (Hinton), extinct

water vole

*Microtus agrestis* (Linné), field vole

### Carnivora

*Canis lupus* Linné, wolf

*Vulpes vulpes* (Linné), red fox

*Ursus* cf. *arctos* Linné, brown bear

*Meles meles* Linné, badger

*Crocuta crocuta* (Erxleben), spotted hyaena

*Panthera leo* (Linné), lion

*Felis sylvestris* Schreber, wild cat

### Proboscidea

*Palaeoloxodon antiquus* (Falconer & Cautley), straight-tusked elephant

### Perissodactyla

*Stephanorhinus (Dicerorhinus) hemitoechus* (Falconer), extinct rhinoceros

### Artiodactyla

*Sus scrofa* Linné, wild boar

*Hippopotamus amphibius* Linné, hippopotamus

*Megaloceros giganteus* (Blumenbach), giant deer

*Dama dama* (Linné), fallow deer

*Cervus elaphus* Linné, red deer

*Bison priscus* (Bojanus), extinct bison

## Interpretation

Probably the first record of the Buckfastleigh Caves was provided by Polwhele in 1797, and although the caves were visited both by MacEnery in 1829 and Pengelly in 1859 (MacEnery, 1859; Pengelly, 1873c), they failed to yield fossils until 1936 when bones were noticed in an unnamed cave (later to be called Joint Mitnor) in Higher Kiln Quarry (Cheesman, 1959; Sutcliffe, 1960). In 1939, systematic investigations of the Buckfastleigh Caves were started by members of the Devon Spelaeological Society, and resulted first in the discovery of Reed's Cave (Hooper, 1950) and then the re-discovery of the cave at the southern end of Higher Kiln Quarry (named Joint Mitnor after its discoverers).

Excavations in Joint Mitnor between 1939 and 1941 were supervised by A.H. Ogilvie, who obtained 4307 specimens of mammal bones and teeth, now known to comprise at least 127 individual animals of 16 species (Ogilvie, 1939–1941; Sutcliffe, 1960). A preliminary account of these excavations (Anon., 1948) assigned the remains loosely to an 'interglacial period', and noted that the cave probably had not been used as a hyaena den, since gnawed bones appeared to be absent.

AJ. Sutcliffe re-studied Joint Mitnor Cave and the area around it, dug three trial pits in the cave during 1954–1955 (Sutcliffe, 1957), and re-examined the mammalian remains collected by Ogilvie. The most significant phase of excavation, however, dates from about 1959 onward, when the cave was set up as a demonstration. This work had already been started before the purchase of the quarry in 1961 and the establishment of the Pengelly Centre (Sutcliffe, 1966). During these excavations, a huge rock was removed with explosives and the roof reinforced, and the demonstration section established. Many bones were found at this stage (now housed in the Natural History Museum), but no new species were added except for the two rodents. Although largely unpublished, important documentation was undertaken, including drawing a detailed section of the deposits (Sutcliffe, 1966; (Figure 5.4)).

Sutcliffe (1960, 1977) regarded the relationship between the Higher Kiln Quarry Caves and the terraces of the River Dart as instructive in determining the history of development of Joint Mitnor Cave. The highest local terrace (the Upper Ambersham Terrace of Green (1949)) overlies the caves at a level of c. 90 m OD. The adjacent 60 m-level (and lower) terraces of the Dart, lie beneath the general level of the cave system and have been correlated with the Boyn Hill and Taplow terraces, respectively, of the Thames (Green, 1949). Irrespective of the validity of these correlations, Sutcliffe (1960, 1977) has suggested that the geomorphological evidence shows that the caves were formed beneath a water-table which would have existed until at least 90 m-terrace times. As the Dart downcut its bed, the water-table was lowered and the caves were drained, probably quite quickly. Sutcliffe (1960, 1977) therefore concluded that the sterile waterlain sediments (bed 1), found throughout the cave system, had accumulated at a time when the caves lay, at least partially, beneath the water-table; there was no evidence to suggest that they had been laid down in a limited vadose channel. The sediments of bed 1 were therefore believed to post-date the 90 m-terrace materials lying above the cave system, but to pre-date the lower Dart terraces (Sutcliffe, 1960).

Sutcliffe (1960) interpreted the materials of bed 2 (the source of the mammal remains) as part of a talus cone which had accumulated beneath a fissure in the cave roof. He argued that the faunal assemblage had resulted from animals falling to their deaths through a former opening, perhaps concealed by bushes, in the cave roof, and then becoming incorporated in the talus deposits beneath. The cave is thus thought to have operated as a natural pitfall trap in this respect, with the opening becoming blocked later by roof-fall materials.

Regarding the faunal remains, Sutcliffe (1960) concluded that the assemblage was composed only of mammals characteristic of warm climatic conditions, or of those with no specific climatic significance; cold-climate species were absent. The assemblage was therefore regarded as having accumulated during an interglacial, its homogeneity suggesting relatively rapid accumulation (Sutcliffe, 1960). Sutcliffe has argued that the faunal remains probably date from the warmest part of the Ipswichian (Eemian) Stage, citing the abundance of hippopotamus, *Stephanorhinus* (*Dicerorhinus*) *hemitoechus* and spotted hyaena, and the lack of horse and *Stephanorhinus* (*Dicerorhinus*) *kirchbergensis* (lager), as the principal evidence. He also notes that the remains of herbivorous mammals far outweigh those of carnivores, and that the cave does not appear to have been a hyaena den, the presence of the bones being best explained as the result of an 'accidental process of accumulation' (Sutcliffe, 1960).

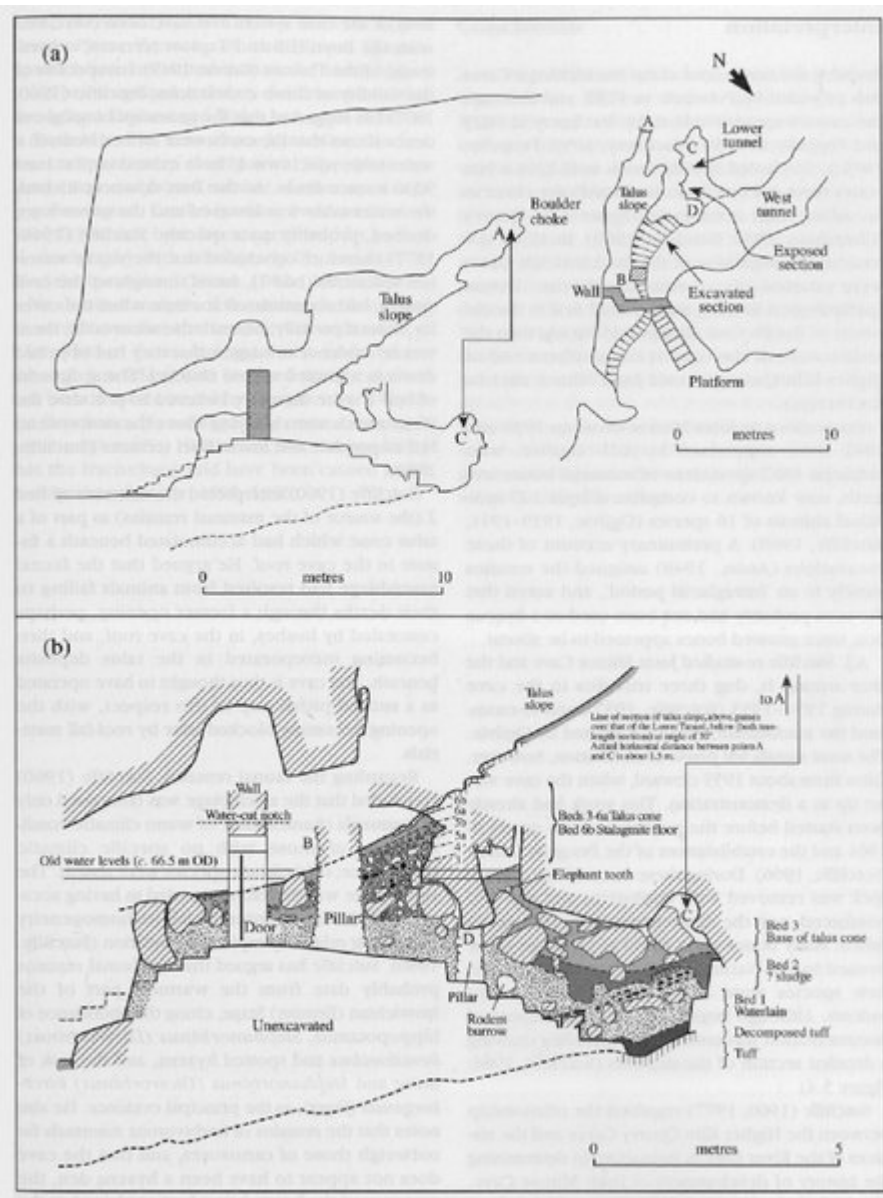
Sutcliffe (1977) correlated the faunal remains from Joint Mitnor Cave with those from the Upper Flood Plain Terrace of the River Thames (Ipswichian), and noted that similar assemblages could be recognized at widely distributed localities throughout England and Wales, at least as far north as Yorkshire. The fauna from Joint Mitnor in fact also compares very closely with 'hippopotamus faunas' reported from a number of other open sites (e.g. Barrington, Cambridgeshire; Swanton Morley, Norfolk) which have been correlated by pollen biostratigraphy with substages Ip IIb, and early Ip III of the Ipswichian (Stuart, 1982a, 1982b, 1995).

No detailed analysis of the stalagmite floor (bed 3), which overlies the fossiliferous sediments at Joint Mitnor Cave, has yet been undertaken, although Sutcliffe (1960) favoured that the surface had been frost-shattered by periglacial activity in the Devensian. He subsequently revised this interpretation (Sutcliffe, 1966) to include the possibility that the fracturing could have been caused by an earthquake (cf. Straw, 1995, 1996).

## **Conclusion**

Joint Mitnor Cave is significant for providing one of the richest known faunal assemblages of Ipswichian age in Britain. The fauna, of 18 species, includes hippopotamus, straight-tusked elephant, wild boar, fallow deer, spotted hyaena, lion, bear and some small mammals, making Joint Mitnor one of Britain's outstanding Pleistocene mammal localities. The cave contains a lower waterlain deposit which probably formed while the cave was at least partly below the water-table, and an overlying talus deposit rich in the bones and teeth of mammals. The animals are thought to have fallen to their deaths through a fissure in the cave roof. A permanent section through the deposits and fossils is preserved in the cave, which now forms part of the William Pengelly Cave Studies Centre. The importance of the cave deposits is heightened by their geomorphological relationship with the adjacent terraces of the River Dart.

## **[References](#)**



(Figure 5.4) Joint Mitnor Cave, Buckfastleigh: (a) General elevation and plan. (b) Detail of excavated section. (Based on the work of A.J. Sutcliffe and adapted from Sutcliffe's original drawing and Sutcliffe's (1974) simplified section.)