Kent's Cavern

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Highlights

Kent's Cavern contains a wide range of Quaternary deposits, the earliest of which date from the Middle Pleistocene. Bones and human artefacts from these deposits were central to nineteenth century controversies about the antiquity of human beings, and the site provides one of the longest records of Pleistocene events in South-West England.

Introduction

Kent's Cavern contains one of the most important Pleistocene sequences in Britain. Its evidence of Middle Pleistocene conditions is unique in the South-West and the site has one of the most protracted histories of research of any British Quaternary locality. Excavations in the cave date from as early as 1824 (Northmore, 1868; Kennard, 1945; Campbell and Sampson, 1971; Straw, 1995, 1996). The earliest excavations by Northmore and Dean Buckland (1824–1825) were shallow and did not penetrate the stalagmite floor below which the majority of bone- and artefact-bearing sediments occur. Work later in 1825 and in 1826, by Reverend J. MacEnery, penetrated farther into the cave and managed to break through the stalagmite to expose softer deposits beneath. In these sediments were found the bones of hyaena and woolly rhinoceros, together with human artefacts, thus demonstrating the contemporaneity of human beings and extinct animals. Because of views prevailing in the 1820s about the age and origin of humans and of geological phenomena, MacEnery did not reveal his findings, and his notes were only published after his death by Vivian (1856) and Pengelly (1869).

Small excavations were also carried out between 1830 and 1850, but most of these were nonsystematic and poorly documented (Campbell and Sampson, 1971). The most major excavations in the cave were conducted by William Pengelly between 1865 and 1880. In contrast to previous excavators, he dug the cave painstakingly layer by layer, using a grid system to establish the three-dimensional context of 'finds' and sediments. The results were published both in monthly and annual reports (Pengelly, 1868b, 1869, 1871, 1878). A final report on the excavations (Pengelly, 1884), however, did not include full sections of the deposits, which remained in Pengelly's excavation diary. Although the finds of bones and artefacts were well recorded by Pengelly, no further work or any illustration of them was published except for a small series by Evans (1897). Further limited excavations were conducted in the 1920s and 1930s (bowie, 1928; Beynon *et al.,* 1929; Smith, 1940). Reviews of all earlier work were published by Kennard (1945) and Campbell and Sampson (1971). The latter authors published a composite stratigraphy partly based on Pengelly's notes, and also reviewed the industries and fauna found in the cave. A short summary by Straw (1983) drew largely on the work of Campbell and Sampson (1971). Lister (1987) examined some aspects of the mammalian fossil record from the site and radiocarbon dates were provided by Campbell and Sampson (1971) and Hedges *et al.* (1989). Proctor (1994, 1996) applied U-series and Electron-spin Resonance (ESR) dating techniques to stalagmite from the cave.

Description

Kent's Cavern [SX 934 56415] is cut in Middle Devonian Torquay Limestone and lies on the west side of the dry Ilsham Valley. It comprises a series of large solution cavities linked by smaller passages cut along joints and bedding planes in the limestone. The largest caverns occur at the intersection of major joints or other partings in the bedrock (Figure 5.2). The infill of the cave passages resulted from a range of interlinked processes common to many karst cave systems, the most important being roof collapse, precipitation of stalagmite and fluvial deposition. Kent's Cavern has two small entrances on the valley side and these have been used by humans and animals to gain access to the cave passages.

The stratigraphy of Kent's Cavern is complex. Different sequences of deposits occur in adjacent parts of the cave and their formation has been controlled by local factors of sedimentation such as flow of water or proximity to the cave walls

or roof. The following generalized stratigraphy is recorded by Campbell and Sampson (1971) and is based largely on Pengelly's notes:

7. *Black Mould:* silt and vegetable matter with artefacts ranging from Mesolithic to Mediaeval in age (0.3 m) *F/D

6. *Granular Stalagmite:* stalagmite with Neolithic and Mesolithic fauna and artefacts (1.5 m) *C2

5. *Stony Cave Earth:* limestone fragments in a light red silt/sand matrix with Upper Palaeolithic faunas, artefacts and hearths (2.0 m) *B2

4. *Loamy Cave Earth:* light red silt/sand with a few limestone fragments, some rounded. Upper Palaeolithic artefacts and faunas in the top of the deposit and Middle Palaeolithic artefacts and faunas through the main body of the deposit (10.0 m) *A2

Erosion level

3. *Crystalline Stalagmite:* stalagmite intermittently present (4.0 m) *C1

2. *Breccia:* angular and rounded limestone fragments in a red sand/silt matrix. Massive concentration of bear remains and Lower Palaeolithic artefacts (3.0 m) *B1

1. *Red Sand:* dark red sand/silt with few artefacts or bones *A1

* bed notations given by Campbell and Sampson (1971)

(maximum bed thicknesses in parentheses)

Older crystalline stalagmite and laminated silts may be present in patches below beds 1–7 and over the bedrock. Detailed differences in this general stratigraphy are noted by Campbell and Sampson (1971).

The principal faunal remains were recovered from three units — the Breccia (bed 2), the Loamy Cave Earth (bed 4) and the Stony Cave Earth (bed 5). A summary of the fauna given by Campbell and Sampson (1971) was compiled from notes and publications of MacEnery, Pengelly and Evans. The fauna of the Breccia (bed 2) is composed overwhelmingly of cave bears (referred to *Ursus spelaeus* Rosenmfiller and Heinroth by Campbell, but noted as *U. deningeri* by Bishop *in* Straw (1996)). Bed 2 also contains remains of the sabre-tooth *H. latidens* and extinct voles *Arvicola greeni* Hinton and *Pitymys gregaloides* Hinton. The latter specimens, recovered by MacEnery between 1825 and 1829, are not well provenanced and may even be derived from older sediments. The Loamy Cave Earth (bed 4) has a profuse fossil fauna dominated by remains of spotted hyaena (*Crocuta crocuta* Erxleben), woolly rhinoceros (*Coelodonta antiquitatis* Blumenbach) and horse (*Equus* sp.), but also including giant deer (*Megaloceros giganteus* Blumenbach), mammoth (*Mammuthus primigenius* Blumenbach) and brown bear (*Ursus arctos* Linné). The fossil fauna in the Stony Cave Earth (bed 5) is less profuse, but similar in composition, with a dominance of horse and brown bear remains, but also with some of hyaena and woolly rhinoceros.

Campbell and Sampson (1971) and Campbell (1977) recorded sparse pollen (two grains only) from the basal Red Sand (bed 1). The Loamy Cave Earth (bed 4) and the Stony Cave Earth (bed 5), however, yielded pollen in abundance, both assemblages being dominated by the pollen of herbs (68% and 61%, respectively) but also with *Salix* and *Juniperus.* The contemporaneity of the pollen and sediment, however, is doubtful and the interpretation of such obviously derived plant fossils very difficult.

The cave has long been famous for its Palaeolithic artefacts. These were a focus of the nineteenth century excavations of MacEnery and Pengelly, and the occurrence of Palaeolithic material has been reviewed by Campbell and Sampson (1971). The earliest industry in the cave is represented by artefacts of Acheulian typology, probably derived from the Breccia (bed 2): modern analysis is difficult because only 29 of the 116 tools recovered by Pengelly between 1872–1900 have survived to be examined by recent workers (Campbell and Sampson, 1971). The tools are mostly of flint and consist of crude hand-axes and flakes with rare choppers and cleavers.

The Loamy Cave Earth (bed 4) yielded most of the other artefacts recovered from the site. Pengelly retrieved about 1000 pieces from the cave, but in Campbell and Sampson's (1971) reassessment only 33 of these could be traced. A further 12 specimens from Ogilvie's excavation (1926) are also described by Campbell and Sampson. These artefacts are of flint and Greensand Chert in about equal quantities, and Campbell and Sampson (1971) recognized seven different tool types characteristic of a Mousterian industry. The upper part of the Loamy Cave Earth yielded artefacts indicative of an Early Upper Palaeolithic industry, made largely of flint, and comprising 18 recognizable tool types. Later Upper Palaeolithic or Creswellian artefacts have been recovered from a level in the Stony Cave Earth known as the 'Black Band'. As with the other industries in the cave, most material was obtained by Pengelly between 1865 and 1880, and has since been lost. The surviving Creswellian material comprises 16 tool types, mostly of flint, as well as needles, awls and harpoon points of bone (Campbell and Sampson, 1971).

Interpretation

The deposits of Kent's Cavern provide a palaeontological and archaeological record for a major section of Pleistocene time which is otherwise poorly recorded in the South-West. The faunal assemblage of the Breccia (bed 2) contains no cold-climate species, and a temperate climate, perhaps towards the end of an interglacial, is indicated (Straw, 1983). The remainder of the faunal remains in the cave indicate open vegetation conditions typical of cool or cold steppe. The ages of these faunas and their associated archaeological assemblages are uncertain. Radiocarbon results reported by Campbell and Sampson (1971) from bone of bear and rhinoceros, probably from the Loamy Cave Earth (bed 4), found in association with earlier Upper Palaeolithic artefacts, gave ages of 28 160 ± 435 and 28 720 ± 450 BP. Bones of bear and giant deer from later Upper Palaeolithic contexts yielded dates of 14 275 ± 120 and 12 180 ± 100 BP. A radiocarbon determination (8070 ± 900 BP) on human bone collected by Pengelly (Hedges *et al.,* 1989) suggests that deposits above the Granular Stalagmite floor (bed 6) are of Mesolithic age. A fragment of human bone, probably of *Homo sapiens* Linné, collected during a 1920s' excavation and probably from the Loamy Cave Earth (bed 4), gave a date of 30 900 ± 900 BP, indicating a relatively early occupation of Britain by *H. sapiens:* the Mousterian artefact assemblage in the lower levels of the Loamy Cave Earth (bed 4) must be older than this, but specific dates are as yet unavailable.

The oldest deposits in the cave which contain faunal remains are difficult to date. The Breccia (bed 2) contains the bones of *Homotherium latidens* and perhaps *Ursus deningeri:* these species, and the accompanying voles, are regarded by most authorities to have become extinct in early Middle Pleistocene times (Stuart, 1982a). The occurrence of this cave bear, sabre-tooth and vole fauna, might indicate a broadly 'Cromerian' age for the Breccia (Straw, 1983). Certainly, the association of these bones with Acheulian artefacts is no longer problematical and it is now widely recognized that humans gained access to Britain relatively early in the Middle Pleistocene (Bishop, 1975; Wymer, 1985; Roberts, 1986; Shotton *et al.,* 1993). However, the possibility exists that the bones of the sabre-tooth and voles were reworked from an older deposit, and the precise age of the Breccia remains far from certain. Dates by the U-series and ESR methods (Proctor, 1994, 1996) suggest ages of 300 to 400 ka BP for the Breccia (bed 2) which would place it in Stage 9 or 11 of the oceanic Oxygen Isotope record. Such dates, particularly the latter, would confirm the early Middle Pleistocene age suggested by the mammalian evidence, and indicate that formation of the Crystalline Stalagmite (bed 3) and the erosion phase occupied a long period of Middle Pleistocene time.

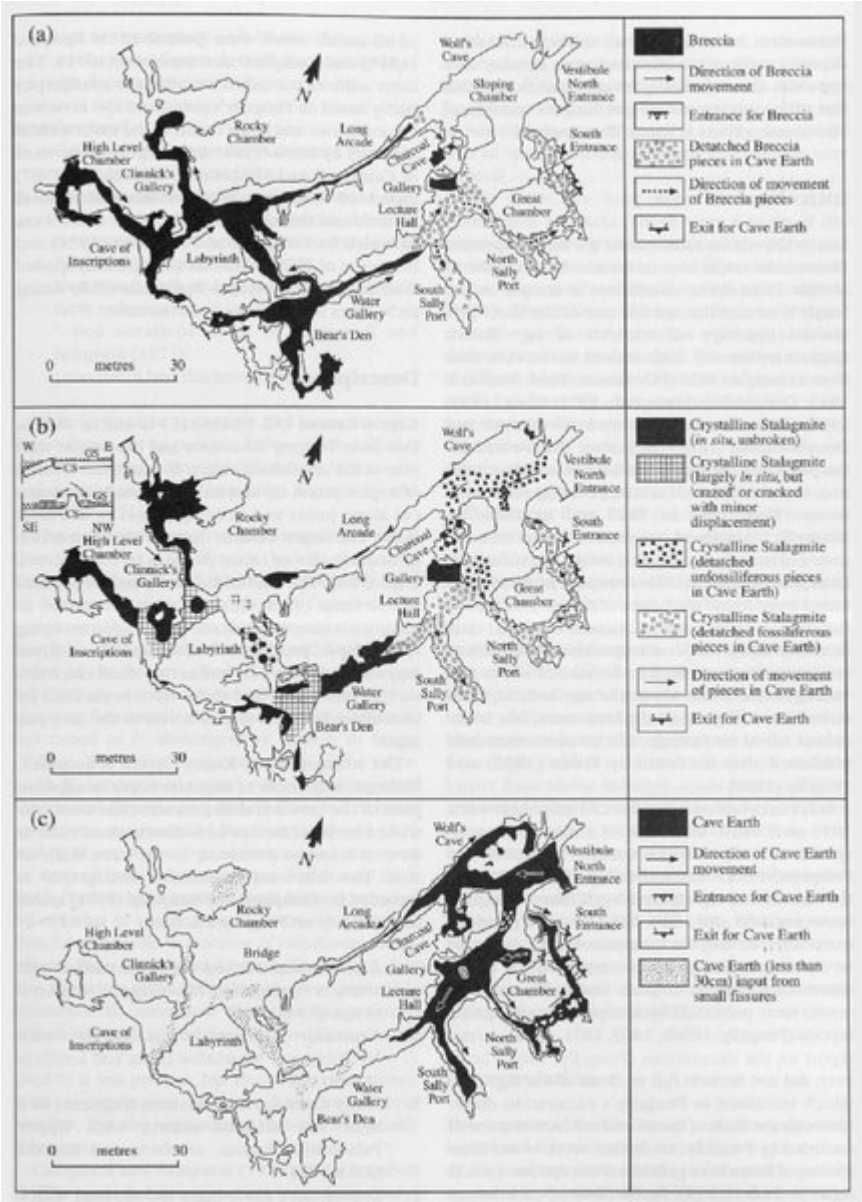
The Crystalline Stalagmite is, in many places within the cave, severely broken so that sharp-edged blocks of it have become incorporated in the Loamy Cave Earth of bed 4 (Figure 5.2). Pengelly suggested that water pressure was responsible for the destruction of this crystalline layer, but Straw (1995, 1996) states that the uniform nature of the fracturing throughout the cave may indicate a more general cause — a seismic event? The youngest parts of the Crystalline Stalagmite have been dated by U-series to *c.* 100 ka BP (Proctor, 1994), thus suggesting that the inferred seismic disturbance occurred in the latter part of Oxygen Isotope Stage 5.

Conclusion

The deposits of Kent's Cavern provide an extensive record of sedimentation which spans the Middle and Upper Pleistocene. Evidence from the site supports both an early date for the occupation of the British Isles by humans and for the entrance of *Homo sapiens* into Britain. The richness of the faunal and archaeological remains makes Kent's Cavern

one of Britain's most important Pleistocene sites. Its famous record of *Homotherium latidens* is unique in this part of the South-West: together with faunal remains at Westbury-sub-Mendip, it may provide evidence for temperate conditions in part of the Cromerian Stage. The remaining deposits at Kent's Cavern, together with the surviving museum specimens, provide great potential for elaborating conditions during a part of the Pleistocene which is otherwise only very poorly represented in South-West England.

References



(Figure 5.2) Kent's Cavern, after Straw (1996). Distribution of: (a) Breccia; (b) Crystalline Stalagmite; (c) Cave Earth. (a)–(c) are shown as indicated in Reports to the British Association by W. Pengelly, 1865–1880. Cave outline is based on the survey by Proctor and Smart (1989).