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KING ARTHUR'S CAVE, WHITCHURCH, HEREFORDSHIRE:

REASSESSMENT OF A MIDDLE AND UPPER PALAEOLITHIC, MESOLITHIC AND BEAKER SITE

by

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ABSTRACT

King Arthur's Cave was first excavated in 1870-1 when Palaeolithic artefacts were found in association with the remains of extinct Pleistocene mammals, and again in the 1920s, when the University of Bristol Spelaeological Society discovered stratified Upper Palaeolithic and Mesolithic lithic industries. This paper presents new evidence for the formation of the cave and its deposits, including soil micromorphology and mammal faunas, and for their dating; and it reassesses the excavations in the light of further investigations since 1952. A visit by Middle Palaeolithic hunters in the early Devensian was followed by further visits by earlier Upper Palaeolithic Lincombian and Aurignacian hunters in a mid-Devensian interstadial. Two successive Later Upper Palaeolithic 'Creswellian' phases, ascribed to the 'Shouldered Point' and 'Backed Point' complexes, are attributed to the late-Devensian Windermere Interstadial and there were also Later Mesolithic and Beaker occupations.

INTRODUCTION

King Arthur's Cave (NGR SU 5458 1558) is situated about 21 km south-south east of Hereford and 1 km south-west of Symonds Yat on the right bank of the River Wye (Figure 1). It is the largest of a series of small caves and rock shelters opening in a rock cliff on the east side of a small dry valley on Great Doward Hill. The cave (Figure 2) consists of two chambers, the Main and Second Chambers, linked by the Passage. Two further passages, the Alley and the Attic, lead out of the Main Chamber. There are two entrances, the smaller known as the Window, which open in the cliff face, here about 8 m high. In front of the cave is a fairly level shelf, the Platform, about 4 m broad; the rock floor of this is hidden by redeposited spoil from excavations in the cave. Undisturbed deposits are exposed in a degraded face on the south-west side of the Platform, extending south-west for perhaps 10 m along the cliff face and north-west to an unknown extent on the steep slope below the excavated area, although the archaeological content of these deposits is thought to be very low.

The cave was first excavated in 1871, with further work by the UBSS in 1925-29 and supplementary investigations in 1952, and has yielded substantial faunal and archaeological material. Here we synthesise the results of the UBSS excavations, drawing on previously unpublished material from the UBSS archive, and reconciling these with the rather deficient information available from earlier excavations to provide a new interpretation of the site. We conclude that King Arthur's Cave contained an important Pleistocene sequence, extending back at

least to Mid-Devensian times, with evidence of Palaeolithic, Mesolithic and later occupations.

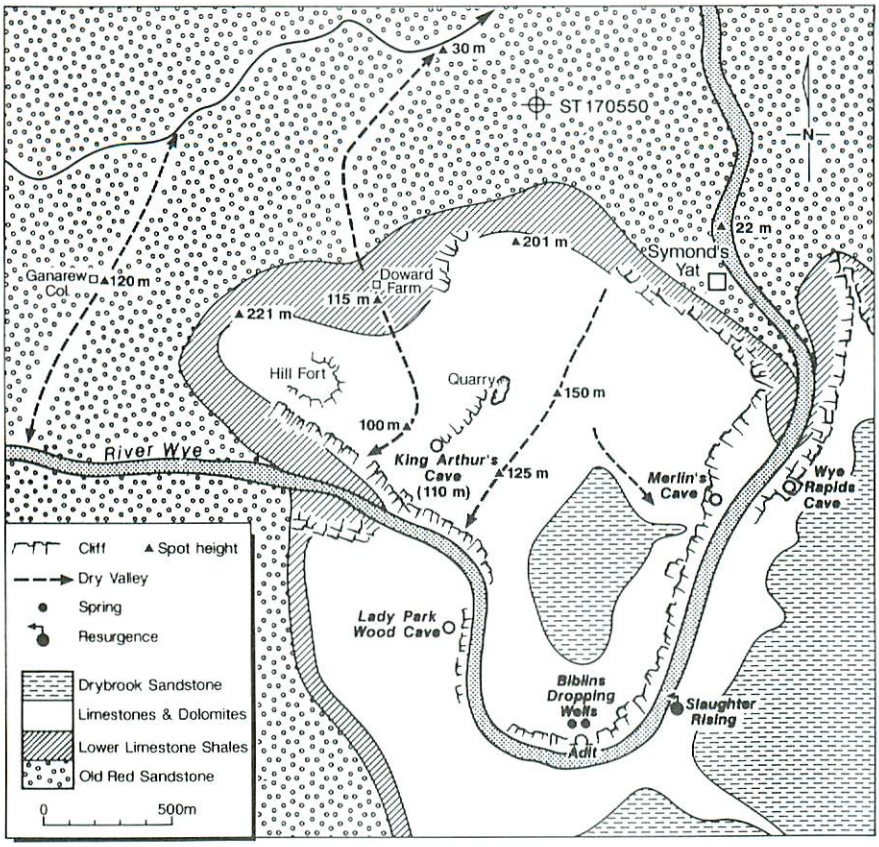

Figure 1. *Location of King Arthur's Cave in relation to the regional geology, topography and other known caves. Based on the 1:50,000 Geological Map* (Crown Copyright reserved).

Regional Geology

The valley of the River Wye at Great Doward exposes a complete sequence in the Carboniferous Limestone Series from the Drybrook Sandstone, which caps the ridge south west of King Arthur's Cave, to the Lower Limestone Shales (British Geological Survey Sheet 233 (Monmouth), Welch and Trotter 1960). The latter comprise 60 to 70 m of grey shales and limestones, but are only exposed on the north and west slopes of Great Doward. Much of the river valley south of Great Doward and the dry valley adjacent to the cave are underlain by uniform fine-grained grey dolomites of the Lower Dolomite unit, here between 100 and 120 m thick. Above lies the Crease Limestone 18 to 21 m thick. The lower 5 m portion of this unit, a white to pink coarse-grained bioclastic limestone with abundant

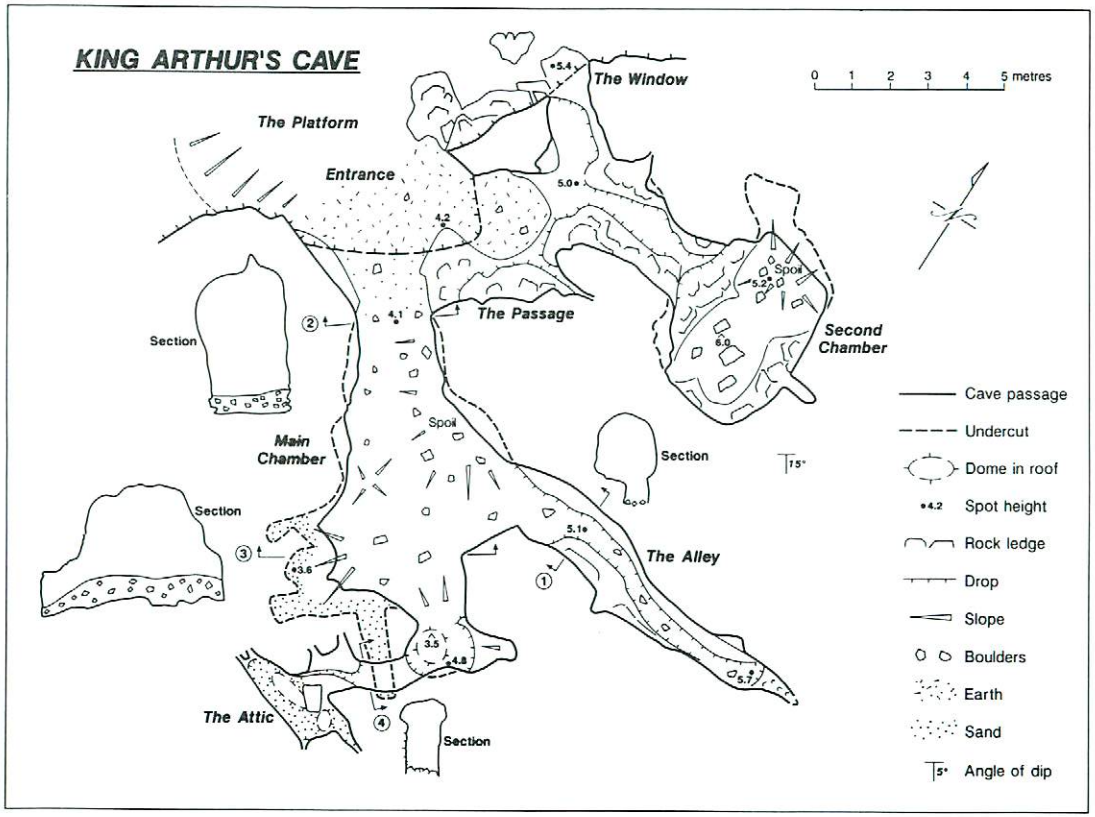

Figure 2. *Plan of King Arthur's Cave*

crinoids is exposed in King Arthur's Cave. While the upper unit, coarse cross-bedded white oolitic limestones with occasional grey coarse-grained dolomites is seen in the quarry north-east of the cave. The overlying Whitehead Limestone is not well exposed, but comprises some 30 m of pale grey thin-bedded fine-grained dolomites and limestones, with minor grey/green and purple shales, passing upward into yellow to red, coarse-grained quartz sandstones of the Drybrook Sandstone.

King Arthur's Cave is close to the south-easterly plunging axis of the Worcester syncline, which runs towards Berry Hill in the Forest of Dean. At the cave, dips are low (10 to 15°) and to the south-south west (150 to 160°). Joints exposed in the cave and adjacent cliffs are generally discontinuous. Two essentially orthogonal (± 10°) vertical joint sets are present, that trending north-south in the roof at the entrance to Main Chamber being subordinate to the east-west set which controls orientation of the Alley, Second Chamber and the Attic. The bed thickness in the lower part of the cave walls is much thinner than in the upper, and close inspection of these beds where not coated with algae, sediment or speleothem indicates substantial mineralisation has occurred. This is particularly evident in the excavations under the eastern wall of Main Chamber, and adjacent to the alcove in Second Chamber. Here a coarse sugary dolomitised matrix has been haematized and cut by dense white 'vein' calcite with stringers of iron. Pockets of this primary ore have been extensively altered by percolating water leaving fine bright red (Munsell 2.5 YR 4/8) ochreous deposits (Gayer and Criddle 1970). Some of the excavations in the floor of the cave may well have been by miners, certainly the alcove in Second Chamber has been excavated in a substantially mineralized zone, presumably in an attempt to trace an iron-rich vein.

Regional Geomorphology

The deeply incised meanders of the Wye valley at Symonds Yat are a well known geomorphological feature (Miller, 1935), and cause the development of steep cliffs and isolated towers in the limestones and dolomites. King Arthur's Cave is perched at an elevation of approximately 110 m AOD, some 90 m above the present valley floor. The entrance is at the southern end of a line of crags in which many other smaller cave entrances are present. The crags form the termination of a dry valley whose axis runs south-west from Doward Farm, before swinging abruptly south-east and plunging into a steep gully down the side of the gorge. This lower section parallels the course of a second higher dry valley, the western slopes of which define the ridge in which King Arthur's Cave is situated. To the north Great Doward Hill rises to 201 m AOD, to the west of the dry valley Little Doward rises to 221 m AOD, the saddle between them lying at 115 m AOD.

A number of other fossil caves penetrating the Crease Limestone are known on the south and east slopes of Great Doward, the best known of which is Merlin's Cave, some 45 m above the river. This was excavated by UBSS in 1924-25 (Hewer 1925, 1926) yielding evidence of a Romano-British occupation, underlain by

hearths and a c. 1.5 m thick cave breccia. The latter yielded remains of voles, molluscs and birds indicative of a cold climate (Hinton 1925, Newton, 1925). There has been no modern re-evaluation of the site, but recently a radiocarbon date of 10,500 yr BP was obtained (Gowlett *et al.* 1986). Other sites include an impenetrable bedding plane tube which was apparently followed by miners excavating a wide addit at Biblins. Directly above this site water issues from the Crease/Lower Dolomite boundary at the 'Dropping Wells', and it is probable the fossil tube is an abandoned resurgence. No other springs are known, but the well developed Slaughter Rising, which takes drainage from the Hillersland area and is fed by the extensive Slaughter Stream Cave, is adjacent on the east bank of the Wye (Lowe 1989). This rising may derive some water from Great Doward, although this has not been proven by tracing. Also on the south bank of the Wye are Lady Park Wood Cave, a 300 m long phreatic complex, and the 200 m long Wye Rapids Cave, both of which were excavated by cavers.

Origin and Development of the Cave

The upper parts of all passages in King Arthur's Cave (and others in the same crags) are apparently phreatic in origin, although they must subsequently have been modified by frost action. The walls show smooth rounded forms, and there are roof domes formed along joints and well seen in the Attic. The Alley and passage leading to the Attic also clearly exhibit vadose characteristics in their lower portions. Features include free meadering forms, vertical trenching, and strong bedding controlled ledges. The latter feature is also present in the Passage just west of Second Chamber. The present floor of the cave is generally obscured by spoil, but excavation has confirmed the vadose morphology of the lower walls of the Passage (Figure 7 below) and Main Chamber, the latter showing clearly waterworn undercutting of the south-western wall (Figure 2, section 3). Furthermore, for the Main Chamber the rock floor slopes inward from the present entrance to opposite the Alley, apparently continuing as an unexcavated undercut under the south west wall (Figure 6 below). In the case of the Alley, the rock floor profile is not known. It therefore appears that the cave functioned as a swallet, the vadose cave stream occupying a sequence of progressively lower routes, initially via the Passage to Second Chamber (then a vertical pot-hole), and then to the Alley (possibly) and Main Chamber. The lowest proved rock floor is in the Passage (Figure 7, below), but this was proved is a narrow fissure. Neither the postulated vadose or phreatic inflows can be confirmed by scallop or other flow markings, frost action having caused extensive weathering (and enlargement) of the cave in the entrance area. Only the minor trench from the Attic and the rear of Main Chamber clearly feed towards the Main Entrance, and the former may represent a latter vadose percolation inflow.

King Arthur's Cave thus appears to have been one of a complex of insurgence caves formed at the end of an active valley draining to the south-east. Initially this may have drained an impermeable catchment on the Lower Limestone Shales, but as Great Doward became upstanding with incision of the Wye, this possible catchment was lost by capture to the north west. Fluvial activity in the valley

was then confined to rare flood events, and periods when nival (snow-melt) dominated climates occurred (such as the colder Mid-Devensian interstadials), and when the ground was perma-frozen. At these times runoff also occurred in the dry valley lying east of King Arthur's Cave and at a higher level. Initially cave development was phreatic, controlled either by a high level River Wye, or the limited capacity of underground circulation. The most probable resurgence was down-dip in the Biblins area. Vadose conditions subsequently developed with the possible sequence of active passages described above. This phase was eventually terminated when the valley was captured by retreat of the steep outer slope of the Wye meander, and the sink complex at King Arthur's Cave was abandoned by the formative stream. After abandonment, percolation water continued to enter the system cutting the Attic trench and depositing speleothem, while retreat of the cliff opened the cave to surface weathering. These last phases of activity are discussed further below with respect to their associated sediments.

HISTORY OF EXCAVATION

Early Investigations, 1870-1872

In 1870, miners digging in the cave in search of iron ore found remains of Pleistocene mammals. These were forwarded by Sir James Campbell to the Natural History Museum in South Kensington for identification by Prof. Richard Owen. In the following year, on 7th June, 1871, the Rev. W.S. Symonds, a well known amateur geologist, began digging in the cave, with William Boyd Dawkins present to identify the bones and teeth discovered (Dawkins 1874, p. 290-1). Symonds described his work in a paper given to the British Association in Edinburgh on 4th August 1871 (Symonds 1871; Anon. 1873; Hopkinson 1873, p. 312-3), and a further account is given in his book Records of the Rocks (Symonds 1872, p. 350-3). Symonds distinguished the following sequence of layers:

1. Black peaty superficial debris with bones of two recent human skeletons and Romano-British pottery; inconsiderable in thickness.
2. Thin band of decomposed stalagmite.

3a. 'Cave Earth no. 1', with flint flakes and chips, and 3 chert and stone artefacts, together with bones and (chiefly) teeth of mammoth, lion, bear, hyena, woolly rhinoceros and horse. About 2 ft (0.6 m) thick 'in the Outer Cave near the entrance' and about 3 ft (0.9 m) thick 'in the Inner Cave'.

3b. Thin 'stalactitic floor', in the 'Inner Cave' resting on:

4. Stratified red sand and silt, 3 or 4 feet (0.9-1.2 m) thick, from which 5 Ordovician pebbles and 1 greenstone pebble were recovered.
5. 'Below this we cut a section showing that the sand and pebbles rested on a thick floor of stalagmite' (1871, p. 436), — 'about two feet (0.6 m) thick (1872, p. 352). Under this was:
6. Cave Earth no.2, separated every few feet by thin layers of stalagmite. 'The

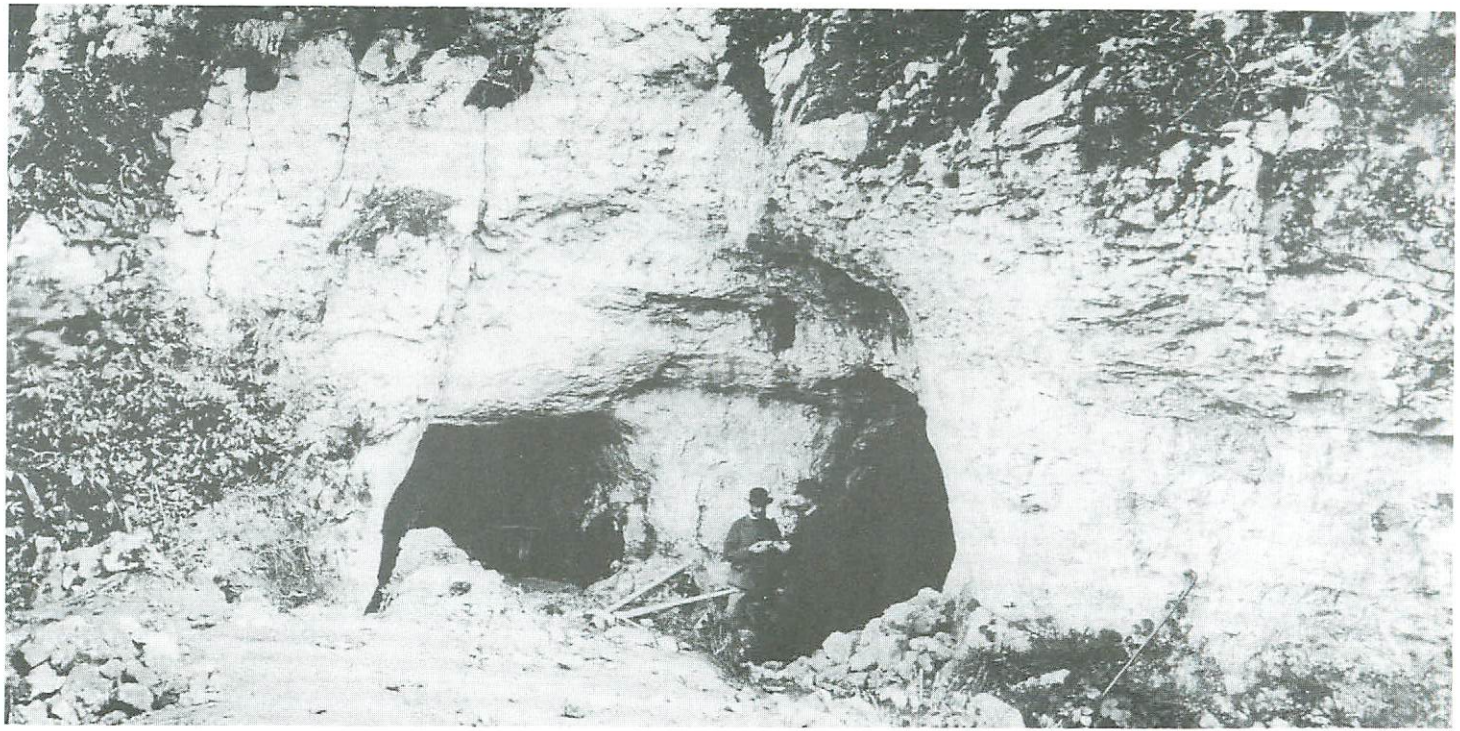

Plate 1 *King Arthur's Cave during the 1871 excavations. Mouth of the Main Chamber to right, the Passage to left. The wheelbarrow is standing on the area occupied by hearth 3, the rocks against which the tools are propped may be the stones cemented with stalagmite beneath which P.B. Symonds found three woolly rhinoceros teeth in 1925. The persons have not been identified but one may be the Rev. W.S. Symonds.* Photograph: Monmouth Museum, Gwent.

fissure' in which this cave earth lay 'was quarried to a depth of 17 ft. (5.18 m), and bored to the depth of 20 ft (6.1 m) (Symonds, 1871, p. 438). The fauna was lion, hyena, rhinoceros, mammoth, giant Irish deer, horse, bison, reindeer (recte red deer). There were a few flint flakes, particularly from the upper layers.

Reconciliation of Symonds' account with later work is made difficult by his inexplicit language and the lack of a plan to show where he actually dug. Some of the obscurities can, however, be elucidated from the report of a visit by members of the Cotswolds Naturalists Field Club on 19 June, 1972 (Anon 1872b, see also Guise 1873). This notes the division of the cave into '. . . two caves or holes, with a long passage. . .' The first hole, named the Bear's Den by the Club, which had been dug to a depth of 22 feet (6.7 m), clearly equates with the Second Chamber, the only place in the cave where it would be possible to accommodate this depth of deposits (Symonds 1871, 17-20 feet; Anon. 1872a, 24 feet (7.3 m) and where the back-filled spoil has not since been bottomed. The second hole, named by them the Lion's Cave (Den)was further inwards and was '. . . lighted up with candles. . .' Here an excavation 10 feet deep had been made showing '. . . river sand and pebbles . . . between two stalactitic floors', the lower of these not yet 'opened', but to be excavated in the ensuing season, the upper 'overlain by cave earth with bones of extinct animals. Their Lion's Den was clearly the inner end of the Main Chamber, the only place large enough for a party of visitors and for Symonds' '. . . several excavations', hence it must be his Inner Cave'. This is confirmed by the presence there of the Red Silt. His 'Outer Cave' was clearly the mouth of the Main Chamber or the outer end of the Passage. Pit 1 (Figure 6, below) was probably dug in 1871-2 in an attempt to cut through the supposed lower stalagmite floor, which in fact proved to be flowstone-veneered bedrock. By July 1872 the cave was reported as 'pretty well cleaned out and the workmen had discontinued their operations there' (Guise 1873, p. 74).

Two of the other small caves and shelters along the line of the rock scarp were also excavated by Symonds in 1871-2; teeth and bones of mammoth, rhinoceros, hyena and beaver being found in one, Bannerman's Cave No.2 which lies some 100 m to the north-east of King Arthur's Cave (Guise 1873, Symonds 1872). Inspection in 1952 and subsequently showed signs of old excavations but little evidence of significant Pleistocene deposits. During a public inquiry held in Ross-on-Wye in January 1956 into an application to extend quarrying of limestone to an area including King Arthur's Cave, evidence was given that another cave system had been found in the course of quarrying and that 'calcited' animal bones had been destroyed by blasting (Warwick 1956a). Permission was refused for an area within 50 yards of King Arthur's Cave (Warwick 1956b), but subsequently the quarry was extended right up to the line of the bluff north-east of the cave, although without further discoveries so far as is known.

The finds from Symonds' excavations were widely dispersed among museums (Jackson 1953, p. 234; Campbell 1977, Vol. 2, p. 123). A.G. Thacker assisted by Dr J. Andrews revised the identifications made by Boyd Dawkins and Symonds of the faunal remains preserved in Gloucester Museum, adding wolf, aurochs,

red deer, brown bear and otter to the list, confirming the presence of giant deer (*Megaloceros*), but removing reindeer (Thacker 1915). Reynolds included King Arthur's Cave among the localities for red deer, reindeer and roe deer (1933, p. 8, p. 27, p. 37) and bison (1939, p. 41), but not for *Megaloceros* (1929, p. 7).

Thacker also reported briefly on the Palaeolithic implements, attributed to the Magdalenian 'Epoch', illustrating four (1912, pl. II). Dorothy Garrod illustrated seven stone artefacts (1926, p. 76-9, Figure 12), three thought on the authority of Thacker to be from the Upper Cave Earth (no. 1), and four from the Lower (no. 2), attributing both series to the Upper Palaeolithic.

Excavations by UBSS, 1925-9

These began in September 1925, were continued in 1926-7 by 10-14 day camps at Easter and in September, and from then until September 1929 mainly by weekend visits. Work in 1925 and 1926 was directed by Tom Hewer, later Professor of Pathology at Bristol University, and that in 1927-9 by Dr Herbert Taylor. The results of the work in 1925-7 were published by Hewer (1926) and Taylor (1928), but the later work was never published, although P.B. Symonds (1938) gives some information. In 1925 the palaeontologist Martin Hinton was on hand to identify the animal remains found. Dr Wilfred Jackson examined the faunal material in Bristol in 1935 and again in 1937 in company with Abbe Henri Breuil, who also commented on the artefacts. In 1925 excavations concentrated on the 'Passage'. In later campaigns the deposits on the Platform and in the Alley were excavated, the filling of the Second Chamber was tested and a narrow trench was dug longitudinally from front to back through the old spoil in the Main Chamber (Figure 3).

Microlithic artefacts from the site were discussed and illustrated by Clark (1932, p. 38-9, Figure 18). Campbell (1977, 1986) and Burdukiewicz (1986) have illustrated some of the surviving Upper Palaeolithic artefacts.

Supplementary Investigations, 1952-1989

In April 1952 ApSimon and Taylor visited the site to obtain samples of the remaining deposits, subsequently reported on by Dr Ian Cornwall, and to prepare longitudinal and cross-sections. A report was written in 1957-8, for which Dr R.J.G. Savage revised the identifications of the extant faunal material. In 1959 Dr Taylor assisted by Mrs E.E. Taylor and Mr and Mrs H. Masterman (and occasionally by ApSimon), re-excavated a large part of the spoil on the floor of the Main Chamber in an unsuccessful attempt to find the deep pit of Symonds 1871 excavation. This failure led to abandonment of the draft report (ApSimon 1969, p. 35), but a plan and sections were exhibited in the Society's museum and have been referred to by Campbell (1977, p. 44-5).

The preparation of the present report was begun in 1982, using previous records and notes prepared by Dr Taylor in 1972. Work done at the site in this period comprised preparation of a new plan of the cave (Appendix B), completion of Taylor's cross-sections and drawing of additional ones, levelling, and examination of geological and geomorphological aspects of the site.

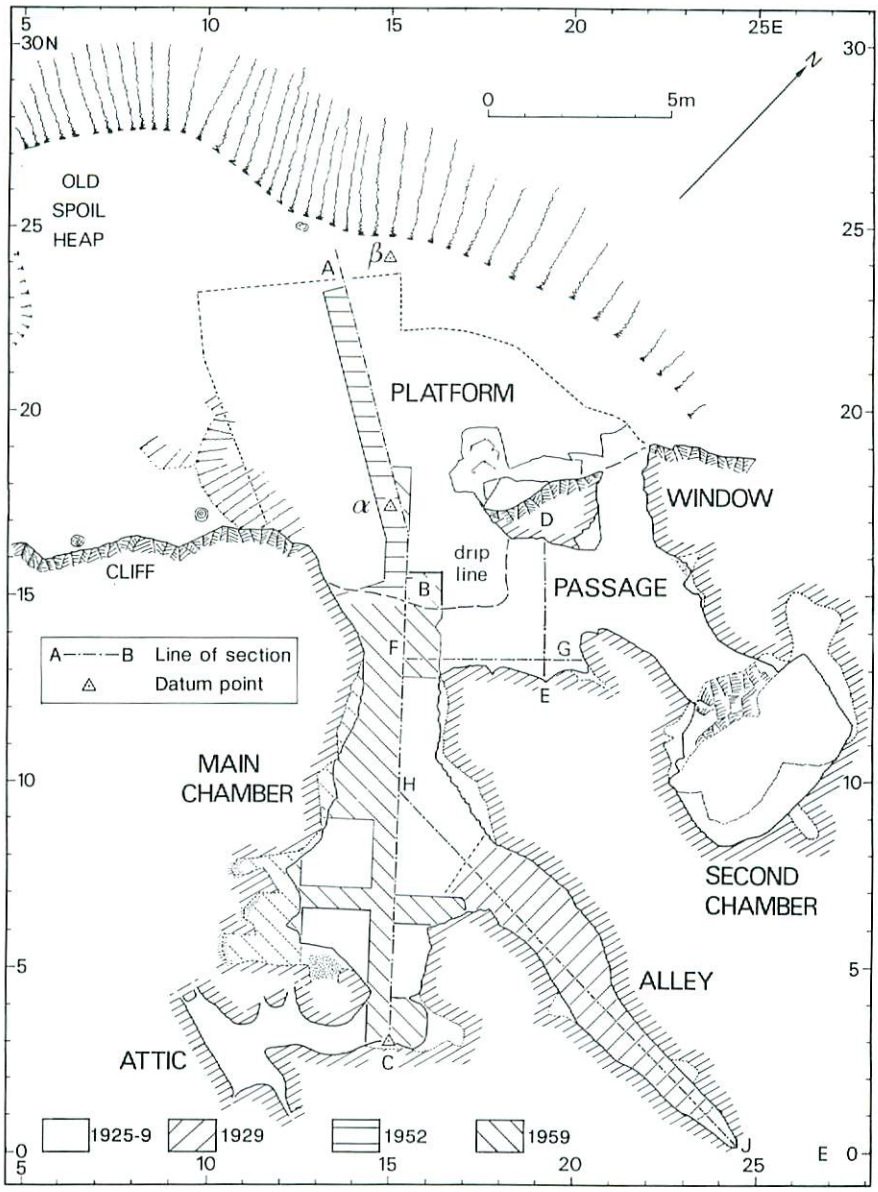

Figure 3. *General plan of excavations by UBSS.*

3. STRATIFICATION

In the following section we describe the sequence of deposits known from different parts of the site. The general scheme is based on the deposits exposed on the Platform by the UBSS excavations, to which are added two additional units

(5 and 6) described by Symonds, but not since re-exposed. Stratigraphic subdivisions and deposits in distinct areas of the site originally thought to belong to the same unit are denoted by suffixed letters. This scheme is used in the post-war finds catalogue, and although not entirely satisfactory, has been retained to facilitate reference to the catalogue, publications and archive (Appendix A). The description of the deposits is based on notes written by Taylor, supplemented and checked by information in the publications and archive and by first-hand observation in 1952, 1959 and 1985-9. Six major units are recognised, and in addition old spoil is designated as Unit 0:

Unit 1 The Humic Layer on the Platform and Symonds' 'Superficial Deposits' inside the cave.

Unit 2 The 'Cryoclastic Breccia' on the Platform and equivalents inside the cave.

Unit 3 The Silt Loams — the Mammoth Layer and Red Loam on the Platform and traces of these inside the cave, probably correlative with Symonds' Cave Earth no. 1 (Upper).

Unit 4 The Red Silts in the Main Chamber.

Unit 5 Symonds' Stalagmite layer in the Second Chamber.

Unit 6 Symonds' Cave Earth no. 2 (Lower) in the Second Chamber.

The Cave Mouth and The Platform

The area of excavation in the cave mouth and on the Platform outside is shown in the detailed plan (Figure 4), taken from a plan by Taylor (archive 11). In the centre of the platform the *in situ* deposits were nearly 2.5 m thick, and extended into the cave mouth where they overlapped the rock walls (more on the west side than on the east). A spread of old spoil covered the deposits on the west wall, confirming that they were probably at their original height. The central area of the cave mouth was occupied by a sloping approach leading down to the cave floor, presumably dug by excavators or miners as a barrow run. The floor of this approach and the adjacent part of the cave were covered by about 0.6 m of old spoil.

The units recognised are given in Table 1, and shown in the longitudinal section A-B (Figure 5), which is based on a sectional profile drawn in 1952, with additional information from Taylor (1928) and from sketch sections and notes in the archive. At the north end of the 1952 cutting where the cut ends of the layers were exposed, Units 2b, 2d and 3c could not be distinguished. The hump of Red Loam (Unit 3d) rising above the floor of the cutting was thought to be *in situ*, but this was difficult to determine in the narrow trench.

Table 1. *Stratigraphic Units — the Platform*

Unit	Name	Thickness (m)
0	Old spoil	< 0.60
1	Humus	0.25 — 0.45
2	Cryoclastic Breccia	
2b	First Hearth	< 0.30
2c	Yellow Rubble	< 0.75
2d	Second Hearth	< 0.40
3	Silt Loams	
3c	Mammoth Layer	< 0.10
3d	Red Loam	0.45 — 0.90

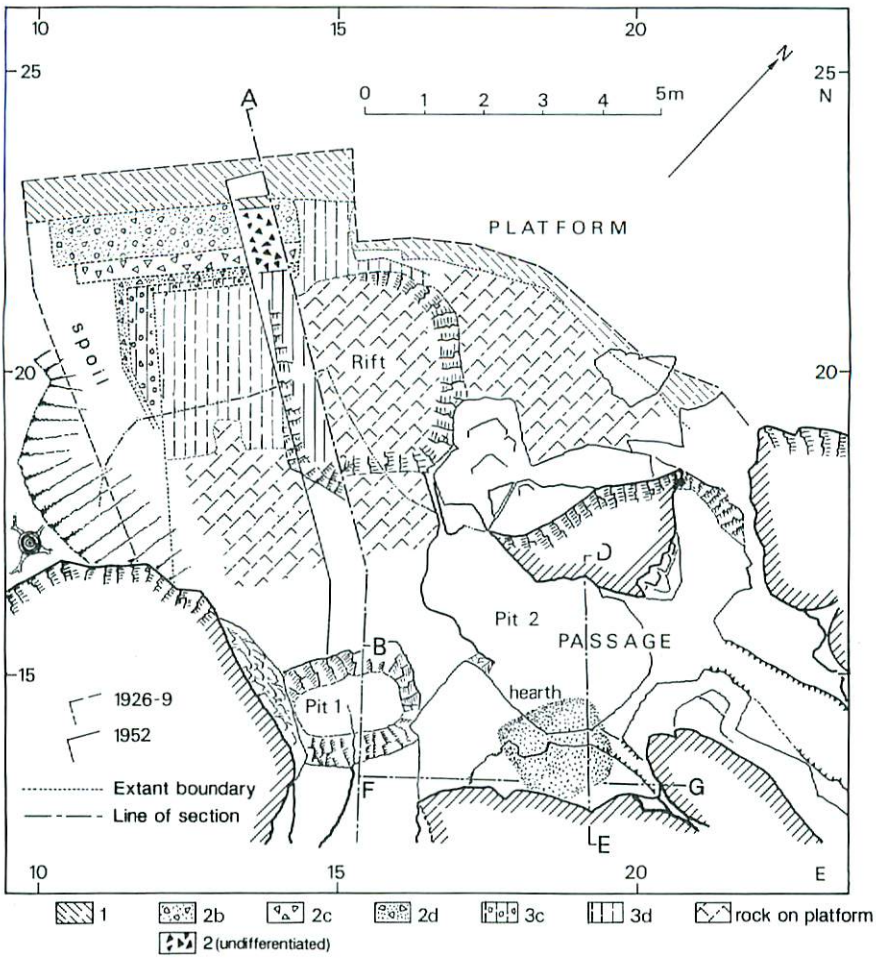

Figure 4. *King Arthur's Cave, detailed plan of features in the outer part of the cave and of the excavations on the Platform.*

Unit 1 Humus

Grey-black humic soil. This unit rested on Unit 2b immediately outside the cave mouth, but further out, where that unit faded out, the Humus overlay the weathered and discoloured upper surface of Unit 2c. The stratigraphic representation of a hearth in the base of the humus relies on a statement by Taylor that Hewer distinguished at least one such hearth, which he was able to separate from the First Hearth proper of Unit 2b. The actual location of this hearth is unknown and there may in fact have been more than one. In one place adjacent to a bush, contamination by Pleistocene faunal material from the overlying old spoil heap had apparently occurred.

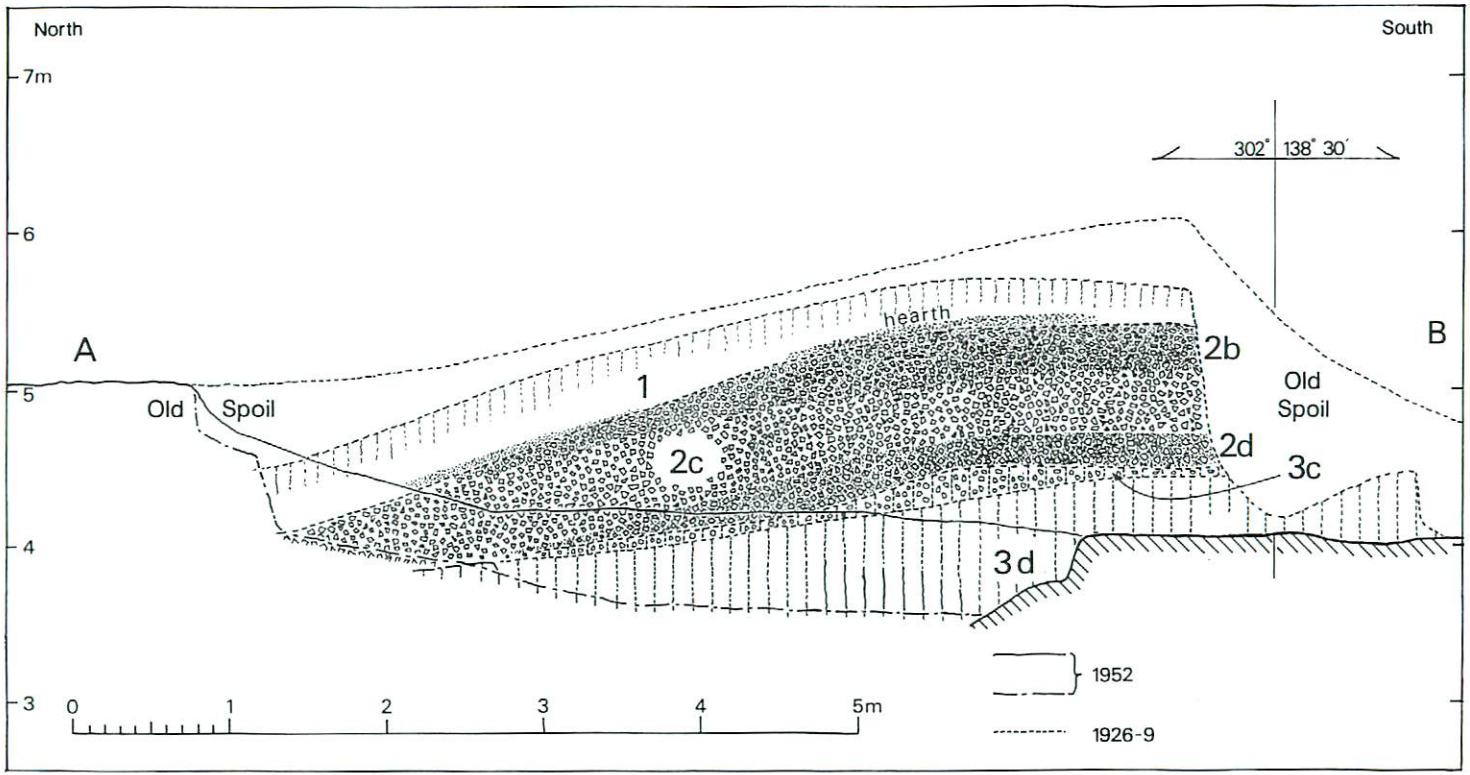

Figure 5. *King Arthur's Cave, reconstructed north-south section (A-B) through the deposits on the Platform: 1. Humus, 2b. First Hearth. 2c Yellow Rubble, 2d. Second Hearth, 3c. Mammoth Layer, 3d. Red Loam.*

Unit 2 Cryoclastic Breccia

Angular limestone clasts with a matrix of comminuted limestone, about 1.1 m thick in total, and 'so closely packed that little or no slipping of even small objects has taken place' (Taylor 1928, p. 64). Three subdivisions were recognised:

Unit 2b First Hearth

Blackish soil with weathered limestone clasts and much ash, about 0.3 m thick close to the cave mouth, but thins out on the slopes. It was continuous with the overlying hearth in the Humus, but could be distinguished by its more ashy appearance and its admixture of weathered rubble (Taylor 1928, p. 68).

Unit 2c Yellow Rubble

Sharply angular limestone clasts, creamy coloured when freshly exposed, turning bright yellow on prolonged exposure, in a matrix of clean comminuted ochreous limestone. About 0.38 m thick close to the cave mouth (thinner on the west side), increasing outwards to about 0.75 m due to the occupation layers above and below thinning and fading out as they were traced away from the cave mouth. There were occasional flint nodules and pebbles.

Unit 2d Second Hearth

About 0.25 m thick just outside the cave mouth, increasing northwards to a maximum of 0.38 m before decreasing to 0.07 m or less. The limestone clasts were less sharp and flint pebbles were more frequent than in 2c above. The layer contained great quantities of ash and finely divided carbonaceous material, but no identifiable charcoal or burnt bone was recovered, and no hearth structures were found. At the outer limit of excavation it was scarcely distinguishable from 2c.

Unit 3 Silt Loams

This unit was composed of reddish brown to reddish yellow or yellow silt loams at least 1 m thick in total.

Unit 3c Mammoth Layer

Reddish silt loam with weathered limestone clasts, from 0.7 to 0.1 m thick. It was called the Mammoth Layer because it was the latest stratum in which remains of mammoth, woolly rhinoceros and hyena were found.

Unit 3d Red Loam

Unlike Unit 3c, the Red Loam contained few limestone clasts. Taylor (1928) distinguished 3 facies within it: 3d.1 red clays, 3d.2 red silts and 3d.3 yellow clays. Facies 3d.1 was not more than 0.1 m thick, passing imperceptibly down into 3d.3 in the centre of the cave entrance and the Platform, and into 3d.2 on the north-east of the entrance. Unit 3d was about 0.45 m thick where it overlay the rock surface in the cave mouth, increasing to as much as 0.9 m where it filled the deeper fissure in the Platform. Taylor noted that the layers on the south-west side of the cave mouth appeared to be rising towards the cave and that it was likely that the upper surface of Unit 3 reached 0.75-0.9 m (4.6-4.75 m asd) above the rock floor of the Platform in the middle of the actual cave mouth. As preserved in 1952, Unit 3d was a slightly clayey brown silt loam becoming yellowish at the base where it rested on the rock surface, except in the deeper fissure on the Platform where it appeared to pass imperceptibly into reddish brown silt.

Unit 5a Speleothem

The rock surface beneath 3d in the cave mouth was covered by a thin film of flowstone with pockets of reddish and bright yellow silt, corresponding to 3d.3. Pit 1 (Figure 4) appears to have been dug through this flowstone into the bedrock surface at the cave mouth in an attempt during the 1871-72 excavations to find Symonds Cave Earth no. 2.

Main Chamber

As noted above, after the excavations by Symonds in 1871 very little remained of the deposits in the Main Chamber. However, careful study of traces on the cave walls makes some reconstruction of the stratification possible (Figure 6, Table 2).

Table 2. *Stratigraphic Units — Main Chamber*

Symonds (1871)		Present Paper		
Unit	**Name**	**Unit**	**Name**	**Thickness (m)**
—		0	Old spoil	—
1	Superficial debris	—		
2a	Thin decomposed stalagmite	—		
3a	Cave Earth no. 1	3a	Silt loam and breccia	< 1.0
3b	Thin stalactitic floor	—		
4	Red silt and sand	4	Red silt	< 1.6
5	Stalagmite floor	5a	Thin flowstone over rock floor	—

Unit 0 Old Spoil

Excavation by Taylor showed that the old spoil covering the floor at the southern end of the Main Chamber was composed of red sandy silt with sharp limestone blocks, probably quarried from the lower wall of the chamber. Two large blocks of irregularly laminated tufaceous flowstone similar to that capping the remaining deposit in the Alley were also found. Nearer the mouth of the chamber the matrix of the spoil was reddish to yellowish silty loam with large limestone blocks, some weathered but many quarried, and including a speleothem coated block c. 0.8 m across. The rock floor was covered by 2-5 cm of very compact dark reddish brown loam with fragments of glass and candle wax, probably a trample layer, beneath which were traces of red loam or sandy silt.

Unit 3a Silt Loam

Traces of this unit reach 6.74 m asd at the back of the Main Chamber, falling to c. 5.50 m at the mouth of the Alley and to c. 4.80 m at the cave mouth. The projected line of fall reaches c. 4.6 m asd on the Platform, about 0.48 m above the rock surface. This agrees well with the reported thickness of c. 0.45 m for Unit 3 on the Platform and with Taylor's estimate above. Remains of Unit 3a, at 15 m E, 3 m N, 7.52 m asd, comprised a pale red (10 R6/3) silty calcareous matrix with rotted sub-angular clasts of coarse pink/grey and green stained limestones and dolomites, micritic fine-grained white limestones and fragments of pink non-calcareous shales. A patch of brownish sandy loam with bone fragments, adherent to the roof of a crevice in the west wall, at 12 m E, 6.65 m N, 5.0 m asd, indicates that the bone deposit extended to the back of the chamber, while the character of the patch recorded at 13.7 m E, 5.1 m N, suggests that this part of the fill resembled the Mammoth Layer, Unit 3c, on the Platform. Patches of reddish cemented breccia against the wall and on the floor in the south-west corner of the chamber, were presumably due to localised carbonate deposition.

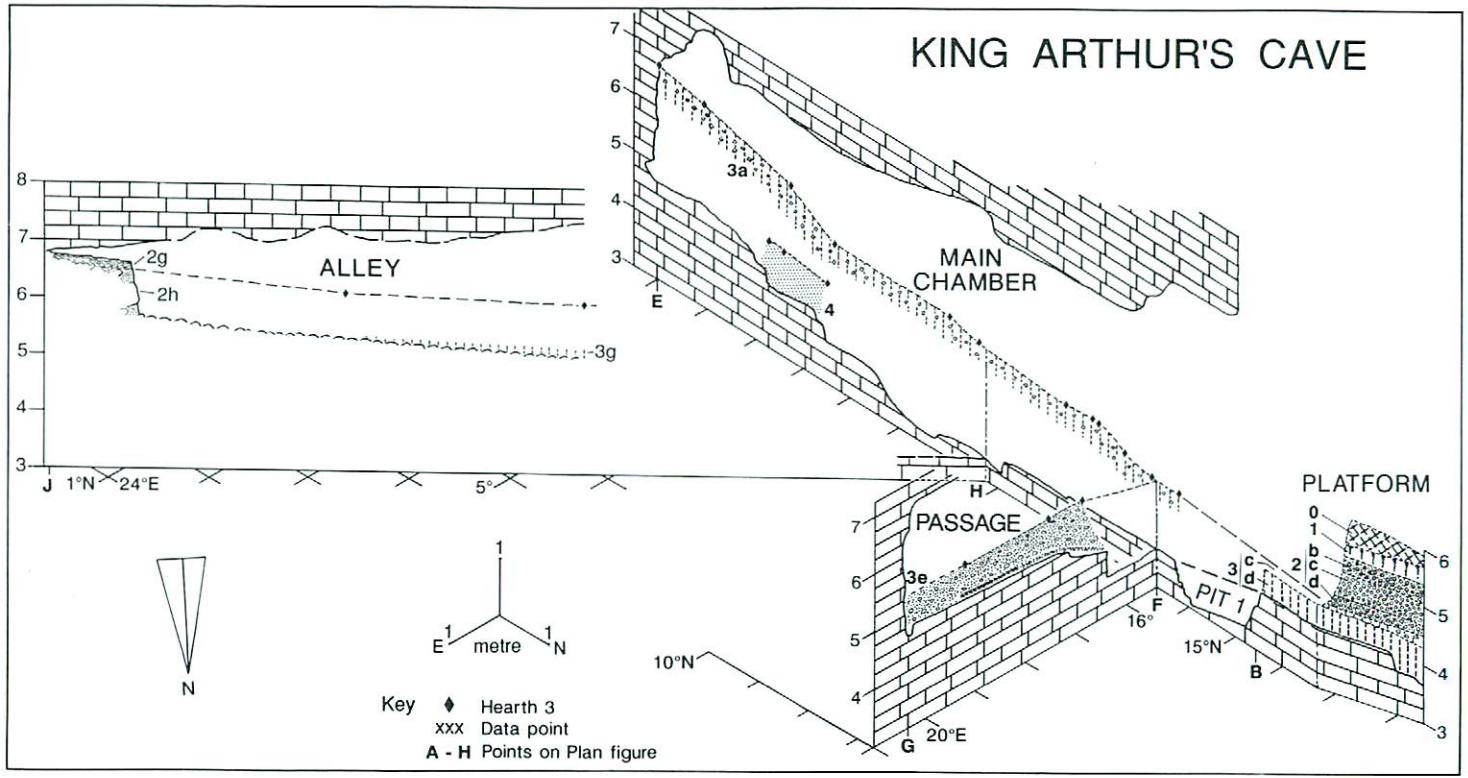

Figure 6. *King Arthur's Cave, axonometric sections showing relationship between deposits on the Platform, and in the Main Chamber, the Passage and the Alley.*

Unit 4 Red Silt

This survives as a distinctive dark red (2.5 YR 3/6) calcareous fine sand to silt fill, well seen at undercut low points on the south-west wall of the Main Chamber. It reaches up to 4.75 m asd, with traces seen to c. 4.8-4.9 m asd on the walls from 5.4-6.5 m N. Of the fragments greater than 2 mm in diameter, 75% are irregular partially dissolved buff-orange iron-stained dolomite, 9% soft buff dolomite, 8% crinoid or bioclastic fragments and 11% green/grey shale.

The Alley

The deposits have been entirely removed except for the remnant exposed in an excavated face about 0.9 m high at the east end. However, the sequence is recorded in a manuscript prepared by Taylor (ms 3, 1937), and given in Table 3.

Table 3. *Stratigraphic Units — The Alley*

Present Paper			**Taylor Ms. 3 (1937)**		
Unit	**Name**	**Thickness (m)**	**Layer**	**Name**	**Thickness (m)**
2g	Tufaceous speleothem	0.1	—	—	—
2h	White Cave Earth	0.85	A	White Cave Earth	0.68—0.45
3g	Red Silt or Loam	?	B	Red Silt or Loam	0.15—0.05
—	—	—	C	White Stalagmitic debris	0.07—0.01

Unit 2g Speleothem.

White tufaceous banded speleothem.

Unit 2h White Cave Earth

Sub-angular fragments of orange sandstone, green and pink shales, and white bioclastic limestone in a white calcareous matrix. When described by Taylor Unit 2h was up to 0.68 m thick near the mouth of the Alley, decreasing eastwards to less than 0.45 m. It rested on Unit 3g at the west end of the Alley, and on rock at the south-east end.

Unit 3g Red Silt or Loam

Taylor provides no detailed sedimentological description of this unit. It had a maximum thickness of 15 cm at the western end of the Alley, was on average 5 cm thick, and thinned out completely eastwards. The white stalagmitic debris (C) reported by Taylor to underlie Unit 3g is almost certainly redeposited, being seen beneath back-fill in the outer part of the Alley. Indeed his report that pieces of tufaceous speleothem (Unit 2g) were present in Unit 2h suggests that much of the sequence he observed may have been redeposited and not *in situ*.

The Passage

Three units, defined in Table 4, were recognised.

Table 4. *Stratigraphic Units — The Passage*

Unit	Name	Thickness (m)
1	Superficial debris	< 0.1
3e	Brownish-grey Cave Earth	0.3—0.8
3f	Red Loam	Traces

Unit 3e Brownish-grey Cave Earth

This unit is not described in the published reports, but in notes written in March 1952, Taylor (HT m.s. 6b) described it as comprising 'greyish brown dust plus greyish slightly weathered limestone fragments (not so brittle as the Yellow Rubble of the Platform)'. In the archive and catalogue this has generally been called 'Upper Cave Earth', but the descriptive name has been preferred here, as avoiding presumptions of correlation with Symonds' Cave Earth no. 1. With the exception of a small exposure in a recess at the foot of the east wall of the Passage (22.8 m E, 15.8 m N, 5.1 m asd) it has been entirely removed. It consists of angular limestone clasts in an unconsolidated brownish-grey silty matrix. Reddish brown traces on the walls of the outer half of the Passage indicate that the top of the unit reached about 5.0 m asd on the north wall and 5.27 m on the south wall, in agreement with the recorded thickness of about 0.45 m on the shelf. The greatest thickness (1.0 m) was recorded at the western end of the rock shelf. During excavation the top 15 cm of Unit 3e (Unit 3e.1) was separated from the deeper deposits (Unit 3e.2 — 0.14 to 0.45 m and 3e.3 — 0.45 to 1.0 m). Hearth 3 (below) is contained within the latter two units which are amalgamated in later discussion.

Hearth 3

This feature, also known as 'The Hearth' (Hewer, 1926) and the Proto-solutrean Hearth' (Taylor, 1928), lay at the base of Unit 3e at a depth of 0.45 m, resting either on loose stones with crevices between or on the rock of the shelf. It was about 1.2 by 1.5 m across and not more than 2.5 cm thick, the relative position and size is shown in Figure 4 being taken from the 1925 plan (Hewer 1926, Figure 2). The reconstructed section (Figure 7) is based on a sketch section by Taylor (Doc. 26, 19- 09-59). In 1926 the hearth could be traced westwards along the south wall of the passage, falling to a depth of 0.94 m as it left the high shelf, and then more gradually towards the mouth of the Main Chamber. This easterly continuation seems to have been simply a thin layer of dark earth, but charcoal fragments were present in the deposits on the shelf.

Unit 3f

Traces of reddish silt or loam seen in the crevices of the rock shelf beneath the hearth.

Second Chamber

As discussed above sufficient vertical extent to accommodate Symonds Second Cave Earth (Unit 6) can only be found in the Second Chamber. However, there is no evidence of a broken flowstone (Unit 5) on the currently accessible walls, and more surprisingly Taylor did not find blocks of speleothem in the old spoil heaps. Traces of reddish brown cave earth reach about 6.2 m asd on the east, and about 6.38 m asd on the south wall. Remnants of a red/brown fine sandy ochreous fill (Unit 4) occur in the alcove on the north side at about 3.3 m asd, and are associated with mineralised vein calcite in the cave walls. No excavation was done by UBSS in the chamber although Taylor's notes suggest that the silty sand was proved to have been at least 0.9 m deep. No faunal remains or artefacts have been found here during work by UBSS.

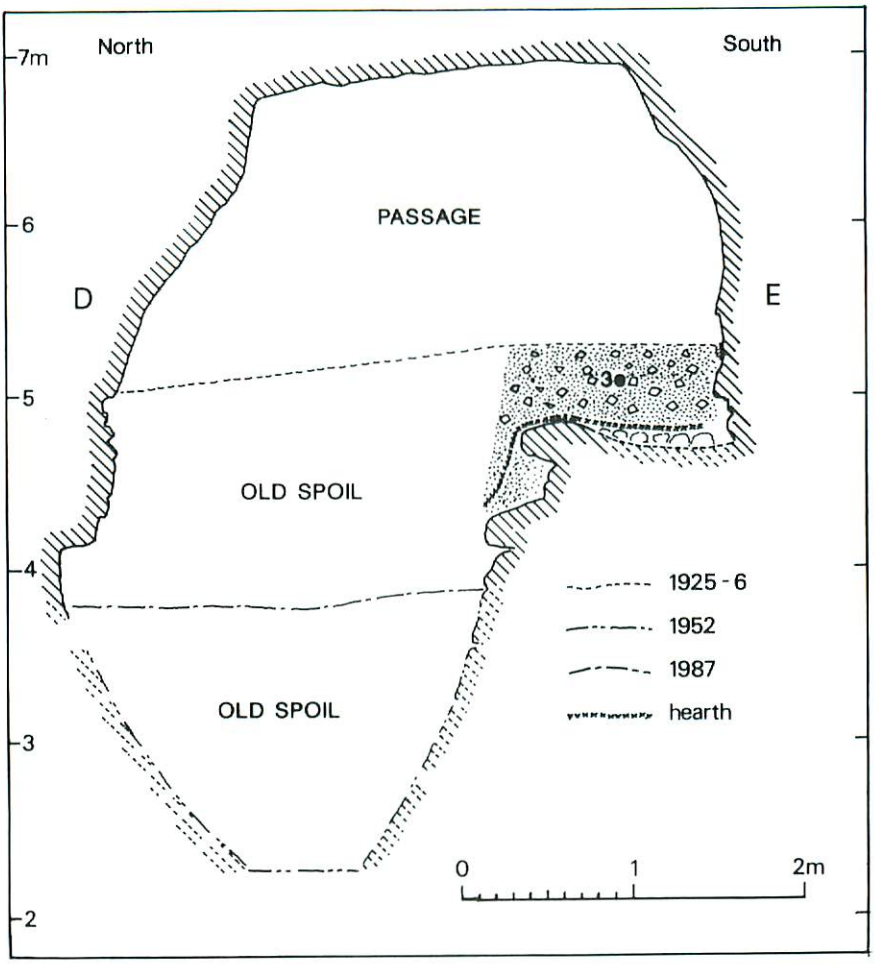

Figure 7. *King Arthur's Cave, reconstructed section (C-D) across the outer part of the Passage.*

Summary of Stratification and Radiocarbon Dating

Figure 8 shows the correlations made here between the stratigraphic units observed in different parts of the cave, as described in detail above. Those made between the Alley, Main Chamber, Platform and Passage are based on sections reported from the UBSS excavations, supplemented in the case of Main Chamber by recent reconstruction using residual sediment fragments to define the upper surfaces of the sedimentary units. The correlation with Symonds stratigraphy must remain somewhat speculative until the spoil can be cleared from Second Chamber, in an attempt to re-expose the lower portion of the deposits.

The interbedded speleothem and cave earth which comprises Unit 6 (Symonds Cave Earth no. 2) appears to be the oldest deposit preserved in the cave, but is most probably localised to Second Chamber. This is capped by the substantial

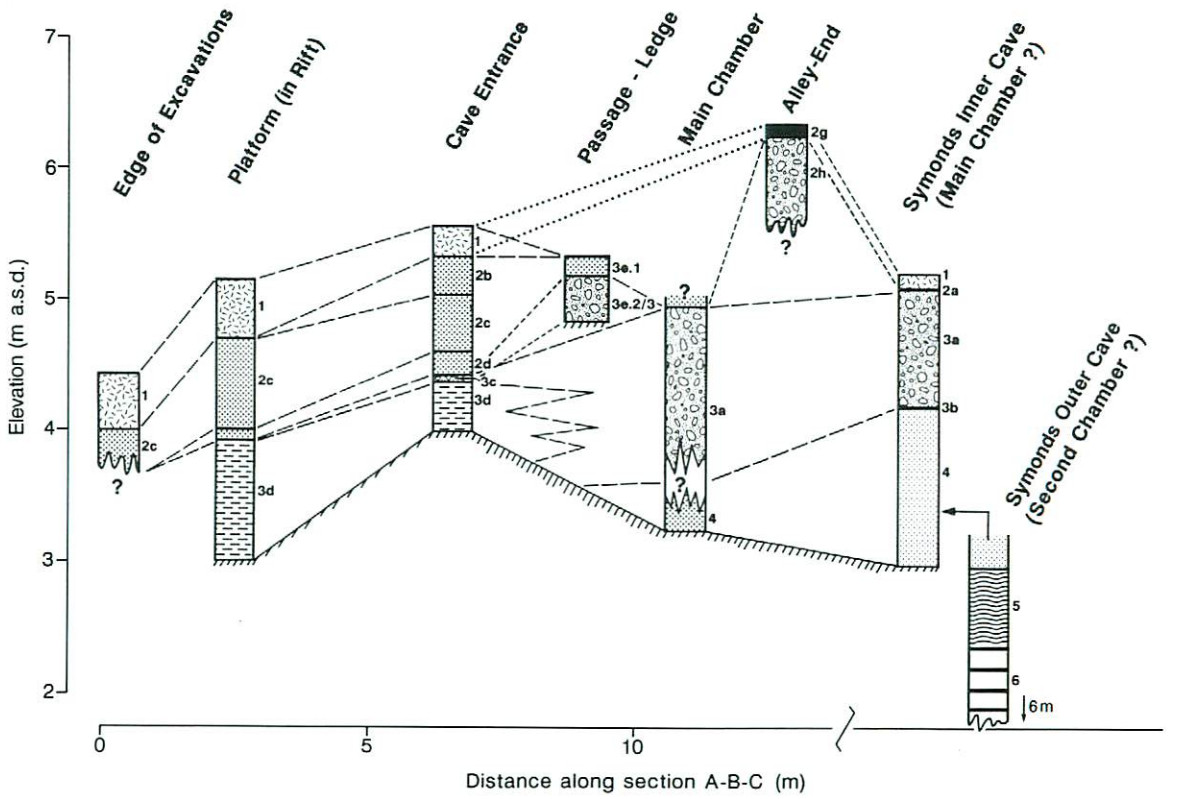

Figure 8. *Correlation of sedimentological units recognised in different areas of King Arthur's Cave. Note that Symonds section is generalised, no elevations for unit boundaries are therefore known.*

flowstone floor of Unit 5, which may be correlative with the thin flowstone coating on bedrock (Unit 5a), which was observed on the Platform. Re-exposure, sampling and uranium series dating of these is needed in order to confirm this correlation, and provide a chronology for these older deposits.

Symonds describes the interbedded sands and silts of Unit 4 as lying above Unit 5, but this has not been confirmed by later excavations. Where preserved in Main Chamber, Unit 4 directly overlies bedrock. The height of its upper surface suggests that it originally filled the lower part of Main Chamber, possibly extending into the Passage (Unit 4a). Unit 4 may have extended onto the Platform and been subsequently removed, or simply been contained behind the bedrock ridge at the mouth of the cave (Figure 8). Unit 3a inside the cave comprises weathered clasts of limestone, dolomite and shale in a pale red to yellow calcareous silt matrix. These pass laterally into clast free silt loams on the Platform (Unit 3d), only the overlying Mammoth Layer (Unit 3c) containing limestone fragments.The geometry of Unit 3 appears to be similar to that of Unit 4, but the upper surface of the wedge of sediments extends from the cave across the bedrock prominence at the cave entrance, so that Unit 3d oversteps Unit 4, and lies on the outward sloping bedrock surface of the Platform. Interestingly, there seems to be some irregularity in the top surface of Unit 3, it being preserved at higher elevations in the Alley and apparently on the Shelf in the Passage, than in the Main Chamber and Platform respectively.

The limestone breccias of Unit 2 are sharply angular, only containing significant non-carbonate matrix when admixed with ash associated with occupation layers, or humus. Unlike the underlying units, the geometry and stratification of this Unit suggest that it reached a maximum height in the vicinity of the cave entrance, sloping down as the sediments decreased in thickness across the Platform somewhat more steeply than Unit 3. In contrast, when followed into the cave, the surface of Unit 2 appears to have been almost horizontal. The upper part of the poorly recorded Unit 3e on the shelf in the Passage (Unit 3e.1) could therefore be correlative with Unit 2 (a suggestion supported by examination of the artefactual finds), but Unit 2 was probably absent from the Main Chamber beyond the Alley. This pattern of deposition appears to have become even more pronounced in Unit 1, a grey-black humic soil, which was thickest on the extremities of the Platform, and wedged out on the horizontal surface of Unit 2 into the cave.

The remnants presently seen at the end of the Alley and coded Unit 2h correspond lithologically with Unit 3a. It seems likely that the surface of Unit 3 also had a significant outward slope in this passage. Thus, a thin wedge of Unit 2 may have been present at the start of the Alley, explaining Taylor's faunal and artefactual finds (see below), which were the basis for this attribution to Unit 2. Almost certainly, however, the pervasive infusion of the deposits in the Aliey with secondary calcite cannot have made the true stratification simple to decipher.

We have not been able to find any traces of Symond's thin stalactitic floor (Unit 3b) of the Inner Cave, and the tufaceous speleothem of the Alley is unsuitable for uranium series dating. The chronology of the deposits is thus based wholly on 5 radiocarbon dates obtained by Dr A.M. Lister, Dr A.J. Stuart and Dr K. Scott, as part of the project for dating Devensian mammoth finds and Late

Devensian mammal faunas in general (Hedges *et al.* 1989). The dates are given in Table 5 , and confirm that the change in depositional pattern described above is associated with a substantial time gap, Unit 3 being Mid-Devensian, while Unit 2 formed during the Late Glacial Windermere Interstadial.

Table 5. *Radiocarbon ages for material from King Arthur's Cave.*

Unit	Sample	Age (yr BP)	Code
2c+	Tooth of red deer (21.468)	12,120 ± 120	(OxA-1562)
2d	Tooth of red deer (21.115)	12,210 ± 120	(OxA-1563)
3c	Piece of mammoth tooth (21.169)	34,850 ± 1500	(OxA-1564)
3d	Piece of mammoth tooth (21.1185)	38,500 ± 2300	(OxA-1565)
3d*	Piece of plate of mammoth tooth (21.964)	> 39,500	(OxA-1566)

+lower half * 30-45 cm depth

SOIL MICROMORPHOLOGY

Four thin sections were prepared by Dr. Ian Cornwall (Institute of Archaeology, University of London) in the 1950s and have been re-examined by Dr Richard Macphail. The descriptions below use the formal scheme of Bullock *et al.* (1985) and Courtney *et al.* (1989) (PPL — plane polarised light, XPL — crossed polarised light, OIL — oblique incident light). However, as the thin sections are very small, and thus only partially representative of the cave sediments, the interpretations below must be considered as tentative. The sections have since been donated to the Institute of Archaeology collection.

Unit 3e Fine Sandy Silt — Passage

Sample E: Passage, at foot of N wall, location 22.8 m E, 15.8 m N, 5.1 m asd.

Structure: weakly massive, with developing blocky structure.
Porosity: 10%, packing pores and fine fissures.
Mineral: coarse, poorly sorted dominant, very coarse sand size, weathered microsparitic cement fragments, some angular, some rounded; few limestone/dolomite; few fine sand size quartz. Fine, dirty brownish grey (PPL), moderate birefringence, reddish (OIL).
Organic: occasional ferruginised root fragments.
Groundmass: open porphyric, crystallitic b- fabric.
Pedofeatures: depletion, abundant moderate decalcification. Crystalline, very abundant micritic and microsparitic cementation; secondary occasional micritic coatings in hollow ferruginous calcitic fragments. Occasional neoformation (?) of ferruginous clay from weathered limestone. Amorphous, very abundant iron staining.

Interpretation: A weathered fine-grained "breccia" of autochthonous material, with some few quartz grains, weakly cemented by ferruginous calcite. It includes roughly rounded calcitic clasts with ferruginous stained edges. These may suggest that an earlier calcite cemented breccia was broken up by cryoclastic activity.

In addition, fine dusty clays have washed into the sediment, coating voids within the weakly cemented breccia. It seems possible that the deposit formed by cryoclastic activity, the debris being washed into cave floor crevices. Minor weathering and contamination by dusty ferruginous clays, probably occurred under mainly cool conditions. As the climate became warmer, sorted clays were washed into the fine sandy silt deposit, possibly from overlying silty clay sediments (cf. Gough's Cave; Macphail and Goldberg, in prep.).

Unit 3d.1 Red Loam — Platform

Sample F: Platform, from base of trench, location 14 m E, 20 m N, 3.8 asd.

Structure: vugy and minor channel microstructure.
Porosity: 25%, dominant medium vugs and common fine to medium channels.
Mineral: C:F ratio, 70:30. Coarse, very dominant, coarse silt size with few mainly fine size quartz; few, fine sand size rounded phosphatised soil. Fine, dirty brown, dotted (PPL), moderately low birefringence, reddish brown (OIL).
Organic: coarse, rare medium size, strongly leached and probably phosphatised, bone fragment; rare, possible rounded fine fragment of phosphatic bird excrement. Fine, very low.
Groundmass: close porphyric, speckled b-fabric.
Pedofeatures: textural, many very dusty void coatings (vugs, channels and faunal passage features). Amorphous, very abundant diffuse ferruginous staining. Fabric, occasional passage features and faunal burrow infills (earthworm?). Excrements, partial biological fabric.

Interpretation: This brown (7.5YR5/4), well sorted, coarse silt to fine sand loam soil, has a dominant wind-blown component that could have been deposited under cool, dry conditions. It also contains coarser elements such as sand-size quartz, which may suggest weak reworking by water (as in brickearth). Other important inclusions are probable coprolitic remains (phosphatised bone, possible bird coprolite and phosphatised soil fragments), that are of cave origin (Courtney *et al.* 1989; Wattez *et al.* 1990). These can form in caves with predatory bird occupation (Andrews 1990) through mixing of pellets and droppings with the cave earth, as at Westbury-sub-Mendip (Goldberg and Macphail 1990). It is possible that these strongly residual phosphatised fragments are relics of earlier cave sediments, and that they became incorporated as the windblown coarse silt was affected by slaking (from snow melt water?). The compacted and immature character of the microfabric indicates that the soil was partially weathered and reworked biologically, before being ultimately affected by dusty clay translocation. This latter feature is typical of Late Glacial soils (Romans and Robertson 1974; cf. Gough's Cave, Macphail and Goldberg in prep.), and most likely formed under cool (boreal) conditions. The sediment character and soil fabric can therefore possibly be associated with cool dry (depositional) conditions, becoming humid as the climate warmed, perhaps during the early part of an interglacial or interstadial, when it became temperate enough to permit some biological activity. Minor slaking and dusty clay coating formation, in newly developed pores, may suggest renewed cooling.

Unit 3d.3 Yellow Clay — Platform

Sample C: cave mouth, immediately overlying rock floor, location 15 m E, 17 m N

Structure: massive.
Porosity: 20%, rough walled vugs.
Mineral: coarse, very dominant fine sand to silt size subangular quartz, and very few calcite; few coarse sand size fragments of sparitic weathering cement; few to frequent rounded brown clay, fine sand size opaques. Fine, dirty greyish-reddish brown (PPL), moderate birefringence, yellowish brown (OIL).
Organic: possible rare root traces present.
Groundmass: open porphyric, crystallitic b-fabric.
Pedofeatures: depletion, very abundant moderate decalcification. Crystalline, very abundant relict microsparitic and micritic cementation (matrix); rare probable pseudomorphic calcite root replacement. Amorphous, very abundant yellowish brown ferruginous staining. Fabric, homogeneous, rare root passage feature.

Interpretation: A deposit of sparse fine sand size quartz and brown clay (wind blown?) subsequently cemented by iron stained calcitic cement. The deposit has been affected by (probable) temperate subaerial weathering, including rooting, causing the decalcification, the yellowish brown colour resulting from weak iron staining.

Unit 4 Red Silt — Main Chamber

Sample B is from the solution pipe at the rear of the Main Chamber, location 13 m E, 5 m N.

Structure and porosity: No information (debris preparation).
Mineral: coarse — fine limit, 10 μm. C:F ratio, not available. Coarse, common subrounded to angular (dolomite?), small stone to coarse sand size limestone clasts, often strongly weathered with iron/clay staining; common weathering component, coarse sand size sparitic calcitic cement (from cave breccia); dominant fine sand size to coarse silt size, angular sparite and micritic cement fragments; few biogenic calcite; very few quartz sand. Fine, dirty reddish grey (PPL), moderately high birefringence, reddish (OIL).
Organic: none observed.
Groundmass: crystallitic b-fabric?
Pedofeatures: depletion, very abundant decalcification. Amorphous, very abundant iron staining.

Interpretation: the reddish brown (2.5YR) calcareous silt has the mechanical composition of a deposit probably originally waterborne. It also contains small (2-6 mm) pebbles of white quartzose sandstone, grey clay (shale), limestone fossils and iron-stained calcareous concretions (''dripstone'' or ''stalagmite''). The limestone fossils and the dripstone fragments are certainly authocthonous, whereas the sandstone pebbles could be foreign. No trace of 'greenstone' material reported by Symonds was found in the bulk samples. As the thin section sample is prepared from debris, interpretation is limited to the suggestion that the Red Silt could have been originally a water-lain, fine grained deposit of limestone/dolomite clasts, which was subsequently cemented by a sparitic cement, perhaps under cool humid conditions. At a later stage solution activity under warmer conditions resulted in decalcification and disaggregation of the matrix, with iron staining by

ferruginous minerals derived from the local weathering mantle or the mineralised dolomitised limestones.

FAUNAL REMAINS

The following analysis and discussion by Katherine Scott refer only to the material from the 1925-29 excavations in the Spelaeological Society collections (see also Scott 1986). The general tabulation of the fauna (Table 6) has been prepared (by A.M.A.) from this and from the publications and relevant museum catalogues. Faunal material in other collections, mostly from the 1870-1 excavations, is noted in Appendix E.

The Platform

Unit 1 Humus

The bones were noted as soft and weathered in appearance, and very light in weight. This material was clearly a mixture of post-glacial and Pleistocene fauna, and notes with the bones state that some were derived from old spoil heaps. The fauna was not therefore included in the analysis.

Unit 2b First Hearth

The bones were again weathered and dirty in appearance, mostly rather soft and very light, some were pale yellow in colour. They are predominantly of red deer, pig and aurochs. Sheep, roe deer and horse are also represented, but only by teeth (Table 7). The condition of the horse teeth, which were mostly well down in the unit, suggests that they may be relict from Unit 2c. Numerous cut- and chop-marks on the bones show undoubted evidence of human activity, but the age of the material is not clear. From the species present, most of the fauna is undoubtedly post-glacial, but it could have been accumulated at almost any time from the Mesolithic onwards. Red deer (*Cervus elaphus*), roe deer (*Cervus capreolus*), aurochs (*Bos primigenius*), pig (*Sus scrofa*) and horse (*Equus ferus*) were indigenous to Britain in the early Flandrian, but existing evidence suggests that sheep and goats were introduced to Britain by Neolithic farmers some time after about 6,000 yr BP (Stuart 1982). On the basis of the fauna, therefore, it would seem either that the bones of the First Hearth assemblage are of Neolithic or later origin (in which case the *Bos*, *Sus* and *Equus* might also be domestic species), or that various assemblages of Flandrian age have become mixed. Evidence from the artefacts suggests that the latter is in fact the case.

Unit 2c Yellow Rubble

Bones from Unit 2c were pale creamy yellow in colour, light in weight and generally hard and brittle, with dull chalky fractures. Table 8 shows that almost all the bones are of red deer, with few remains of horse. The domestic species that characterise the overlying level are absent, with the exception of one pig tooth which is probably intrusive. There are artefacts from this level and although

Table 6. *Summary of fauna from King Arthur's Cave.*

		Context										
		1925-9								1871		
		2b	2c	2d	2h	3g	3c	3d	3e	Th	CEl	CE2
Man	*H. sapiens*		+									
Hedgehog	*Erinaceous europeus*	?										
Brown bear	*Ursus arctos*	+			?		+	+	+	+		
Cave bear	*Ursus spelaeus*									+	+	
Spotted hyaena	*Crocuta crocuta*						+	*	*	*	+	+
Lion	*Panthera leo*									+	+	+
Wild cat	*Felis sylvestris*	?								?		
Otter	*Lutra vulgaris*									+		
Wolf	*Canis lupus*				?					+		
Arctic fox	*Alopex lagopus*				+							
Red fox	*Vulpes vulpes*		+					+				
Mammoth	*Mammuthus primigenius*						+	+	+	+	+	+
Wild horse	*Equus ferus*	+	+	+	+	?	*	*	*	*	+	+
Woolly rhinoceros	*Coelodonta antiquitatis*					?	+	+	*	+	+	+
Giant deer	*Megaloceros giganteus*									+		+
Red deer	*Cervus elaphus*	*	*	*	+	?	+	+	*	+		+
Roe deer	*Capreolus capreolus*	+										
Reindeer	*Rangifer tarandus*		+		?			+	*			
Bison	*Bison sp.*									+		+
Aurochs	*Bos primigenius*									+		
Bovid (indet.)	*Bos/Bison*	*		+				+	+	*		
Sheep	*Ovis sp.*	+							+			
Pig	*Sus sp.*	+	+									
Norway lemming	*Lemmus lemmus*		+									
Arctic lemming	*Dicrostonyx torquatus*	+	+									
Northern vole	*Microtus oeconomus*		+									
Tundra vole	*Microtus gregalis*	+	+									
Bank vole	*Clethrionomys glareolus*	+										
Beaver	*Castor fiber*	?										
Hare	*Lepus timidus*		+		+		?		+			
Steppe pika	*Ochotona pusilla*		+									
Birds (n.d.)	*Aves*		?									

Notes: 1. 1925-9 fauna; unit numbers this text.
2. 1871 fauna; **Th** = from Thacker (1915); **CE1** = Symonds Cave Earth no. 1, **CE2** = Symonds Cave Earth no. 2 from Hopkinson (1873).
3. + = present * = numerous, ? = unconfirmed.

Table 7. *King Arthur's Cave, faunal remains, Unit 2b (numbers of bones, teeth or fragments identified, not the estimated minimum number of individuals). (cerv. = cervid, Indet. = indeterminate, bov. = bovid, dist. = distal, prox. = proximal, diaph. = diaphysis, frags. = fragments).*

	Horse	Red deer	Roe deer	Indet. small cerv./ bov.	Sheep	Large bovid	Indet. med/ large bovid	Pig	Bear	Rein-deer	Hyaena
Antler frags.	—	3	—	—	—	—	—	—	—		
Dentition (incl. frags.)	8	44	9	—	13	23	—	26	—	3*	3*
Mandibular and cranial fragments	—	1	—	—	—	—	—	—	—	—	—
Humerus, dist.	—	—	—	1	—	—	—	—	—	—	—
Ulna, prox.	—	—	—	—	—	—	—	—	—	—	—
Radius	—	—	—	—	—	—	—	—	—	—	—
Carpals	—	1	—	—	—	1	—	—	1	—	—
Metacarpal, prox.	—	1	—	—	—	—	—	—	—	—	—
Acetabulum	—	1	—	—	—	2	—	—	—	—	—
Femur	—	—	—	—	—	—	—	—	—	—	—
Tibia, dist.	—	2	—	—	—	—	—	—	—	—	—
Tarsals, calcaneum	—	1	—	1	—	—	—	—	—	—	—
—astragalus	—	1	—	1	—	—	—	—	—	1*	—
Metatarsal, prox.	—	—	—	—	—	—	—	—	—	1*	—
—diaphysis	—	—	—	—	—	—	—	—	—	1*	—
Metapodia, dist.	—	2	—	—	—	—	—	—	—	—	—
—diaph. frags.	—	1	—	—	—	—	—	—	—	—	—
Phalanges, 1st, prox.	—	—	—	2	—	1	—	—	—	—	—
—dist.	—	2	—	2	—	1	—	—	—	—	—
2nd, prox.	—	—	—	—	—	1	—	—	—	—	—
—dist.	—	—	—	—	—	—	—	—	—	—	—
3rd	—	—	—	—	—	—	—	3	—	—	—
Sesamoids	—	—	—	—	—	1	—	—	—	—	—
Vertebrae (incl. frags.)	—	—	—	—	—	1	5	—	—	—	—
Ribs	—	—	—	—	—	—	2	—	—	—	—

* Labels suggest possible admixture from old spoil heap

there appear to be no cut-marks on the bones, they are highly fragmented, and in addition, red deer metapodia show evidence of oblique chopping (eg. 20.159) or longitudinal splitting (eg. 20.142, 20.147). These features suggest butchery and processing for marrow. There are no tooth-marks or signs of gnawing that might indicate carnivore activity. In September 1929 a number of fragments of human skull, face and a fragment of mandible, some possibly burnt and all possibly from the same individual, were found just below the middle of the layer, nos. 13-28 from 76-83 cm deep, nos. 29-35 from 68-76 cm deep (Appendix C). Taylor's record of the find contains no suggestion of disturbance. Unfortunately they do not seem to have survived the burning of the museum in 1940.

Overall it seems likely that the prevalence of red deer in this unit suggests more woodland and milder climatic conditions than had previously characterised the vicinity of the cave during the accumulation of the deposits — perhaps those

Table 8. *King Arthur's Cave, faunal remains, Unit 2c (number of bones, teeth or fragments identified, not the estimated minimum number of individuals). (Key as Table 7).*

	Horse	Red deer	Rein-deer	Indet. cervid*	Pig	Fox	Hare
Antler frags.	—	1	—	—	—	—	—
Mandibular and cranial fragments	—	5	—	—	—	—	—
Dentition (incl. frags.)	7	40	1	—	1	1	x
Humerus, dist.	—	2	—	—	—	—	—
Ulna, prox.	—	1	—	—	—	—	—
Radius, prox.	—	1	—	—	—	—	—
Carpals	—	4	1	—	—	—	—
Metacarpal, prox.	—	1	—	—	—	—	—
Pelvis, ilium	—	1	—	—	—	—	—
— acetabulum	—	2	—	—	—	—	—
Femur, prox.	2	—	1	—	—	—	—
— dist.	—	1	—	—	—	—	—
Patella	—	1	—	—	—	—	—
Tibia, prox.	—	1	—	—	—	—	—
— dist.	—	1	—	—	—	—	—
Tarsals, calcaneum	—	4	—	—	—	—	—
— astragalus	—	3	—	—	—	—	—
— naviculo-cuboid	—	—	—	—	—	—	—
— cuneiform	2	3	—	—	—	—	—
Metatarsal, prox.	—	5	—	—	—	—	—
Metapodial diaph. frags.	—	6	—	—	—	—	—
Metapodia, distal	—	1	—	—	—	—	—
Indet. diaphysial frags.	—	—	—	23	—	—	—
Phalanges, 1st, whole	1	—	—	—	—	—	—
— prox.	—	1	—	—	—	1	—
— dist.	—	9	—	—	—	—	—
2nd, prox.	—	2	—	—	—	—	—
— dist.	—	—	—	—	—	—	—
3rd	—	—	—	—	—	—	—
Sesamoids	2	1	2	—	—	—	—
Vertebrae	—	—	—	—	—	—	—
Ribs	—	—	—	5	—	—	—

* — cf red deer x — present

of a Late Devensian interstadial. Red deer is uncommon in deposits of Devensian age where species generally associated with cold climate and open habitat (e.g. mammoth, woolly rhino and reindeer) are abundant. It became the dominant large mammal species with the rapid expansion of forest in the postglacial (Lister 1984). However, the radiocarbon date of c. 12,120 yr BP as well as the small vertebrate fauna (see below) leave no doubt of a Devensian age for this material.

Recently Dr Andrew P. Currant (British Museum of Natural History) has re-examined the small mammal remains from Unit 2, including previously unexamined material from Unit 2b. The latter includes tundra vole (*Microtus*

gregalis), arctic lemming (*Dicrostonyx torquatus*) and bank vole (*Clethrionomys glareolus*). In the upper part of Unit 2c arctic lemming and tundra vole are associated with Norway lemming (*Lemmus lemmus*), steppe pika (*Ochtona pusilla*), and hare (*Lepus sp.*), while the lower part includes only hare, steppe pika and northern vole (*Microtus oeconomus*). With the exception of the single specimen of bank vole which is of markedly different preservation, and almost certainly an intrusion of Holocene age, this whole group appears to be a broadly contemporaneous Late Glacial assemblage. The codominance of arctic lemming and steppe pika fits rather well with other assemblages dating from final stages of the Late Glacial stadial (Loch Lomond Readvance) dating from around 10,000 yr BP and slightly younger. The association is likely to be the result of owls perching on the cliff above the cave, the tiny bones subsequently filtering down through the breccia, despite the generally tight packing of the comminuted limestone.

Unit 2d Second Hearth

The unit was very rich in bones, which were similar in preservation to those of Unit 2c. Species and body-part representation in this deposit are very similar to those in the overlying Yellow Rubble (Table 9), and the same signs of chopping and splitting are present. However, the bones are considerably more fragmented. Charcoal is reported from this level, so perhaps the high degree of fragmentation is in some way related to butchery or cooking activities around a hearth. None of the bones appears to have been burnt. As discussed above, the prevalence of red deer and a radiocarbon date of c. 12,210 yr BP suggest accumulation under interstadial conditions during the Late Devensian.

Unit 3c Mammoth Layer

The bones were yellowish to brownish and somewhat darker and heavier than those found in Unit 2d, with smooth even glossy surfaces. This layer (named on account of the recovery of part of a young mammoth tooth in the deposit) has a very small fauna (Table 10). Horse appears to be well represented, but the number refers principally to dental fragments. Scott (1986) suggested that the presence of hyena, mammoth and woolly rhino in this unit clearly indicated that this material accumulated before the glacial maximum, as these species were not known in Britain from any reliable stratigraphic context during or after the ice advance (Stuart 1982). Subsequently it has been pointed out that this is not true for mammoth: a review of recent radiocarbon dates indicates the presence of this species in Britain as late as the 13th and 12th millennia (Lister 1991, Stuart 1991). There are also dates from western Europe suggesting the Late Glacial presence of hyena and woolly rhinoceros (Stuart 1991). It seems unlikely that mammoth would have been the sole survivor of the large mammal community in Britain in the Late Glacial, and it is more probable that the other species have yet to be dated from reliable stratigraphic context. However, the radiocarbon date of c. 34,850 yr BP supports a mid-Devensian age. The role of people in this accumulation is debatable. There are artefacts (see below) but heavy gnawing of the bones, and their species and body-part composition suggest that they were accumulated primarily by hyenas (Scott 1986).

Table 9. *King Arthur's Cave, faunal remains, Unit 2d (numbers of bones, teeth or fragments identified, not the estimated minimum number of individuals). (Key as Table 7).*

	Horse	Red deer	Large bovid	Cervid/ bovid
Antler frags.	—	1	—	—
Mandibular & cranial frags.	1	13	—	—
Dentition (incl. frags.)	10	56	—	—
Scapula	—	6	—	—
Humerus, prox.	—	—	—	—
— diaph.	—	2	—	—
— dist.	—	2	—	—
Ulna, prox.	—	2	—	—
Radius, prox.	—	1	—	—
Carpals	—	4	—	—
Metacarpal, prox.	1	3	—	—
— diaph.	1	—	—	—
— dist.	1	1	—	—
Pelvis, ilium	—	3	—	—
— acetabulum	—	3	—	—
Femur, prox.	—	—	1	—
— dist.	—	1	—	—
Tibia, prox.	—	2	—	—
— diaph.	—	2	—	—
— dist.	—	7	—	—
Tarsals, astragalus	—	8	—	—
— calcaneum	—	1	—	—
— naviculo-cuboid	—	2	—	—
Metatarsal, prox.	—	17	—	—
— dist.	—	6	—	—
Metapodial diaph. frags.	—	12	—	—
Indet. diaph. frags.	—	—	—	9
Phalanges, 1st, complete	—	2	—	—
— prox.	—	3	—	—
— dist.	—	2	—	—
2nd, complete	—	1	—	—
— prox.	—	1	—	—
— dist.	—	3	—	—
3rd	—	2	—	—
Vertebrae	—	11	—	—
Ribs*	—	—	—	—

* Present but fragments discarded in 1975

Unit 3d Red Loam

Preservation was similar to bones from Unit 3c, but fragments found in the cave mouth were heavy, deep yellow to greyish in colour and only some were glossy. The assemblage is small, though larger than that from Unit 3c (Table 11). The fauna is similar to that from 3c, with the addition of reindeer and fox. As in the case of the Mammoth Layer, the presence of hyena and of chewed bones suggests that it is den material, probably of mid-Devensian age (see Discussion

Table 10. *King Arthur's Cave, faunal remains, Unit 3c (numbers of bones, teeth or fragments identified, not the estimated minimum number of individuals). (Key as Table 7.)*

	Hyaena	Bear	Mam-moth	Horse	Woolly rhino	Red deer	Large bovid
Dentition (incl. frags.)	2	—	1	19	1	3	—
Metacarpal, dist.	—	—	—	—	—	1	—
Metapodial frag.	—	—	—	—	1	—	—
Tibia, dist.	—	—	—	—	—	—	1
Phalanges, 3rd	—	1	—	1	—	—	—
Ribs*	—	—	—	—	—	—	—

* Present, but fragments discarded in 1975

below). Contrasting with these are the un-gnawed humerus (20.759) and femur (20.1012) of bear from the top 15 cm of the unit. Currant (pers. comm.) suggests that these bones are most probably of Late Devensian age, and were deposited following the death of a hibernating bear which had excavated a den in the surface of the deposits. Similar finds of complete bear bones have been noted, for example, in Gough's Cave (Currant 1986). Burnt bone is present to 45 cm, including a burnt horse tooth in the upper 15 cm of the unit.

Table 11. *King Arthur's Cave, faunal remains, Unit 3d (numbers of bones, teeth or fragments identified, not the estimated minimum number of individuals). (Key as Table 7.)*

	Hyaena	Bear	Mam-moth	Horse	Woolly rhino	Red deer	Rein-deer	Large bovid	Indet. med/ large	Fox
Dentition (incl. frags.)	21	—	2	21	7	4	6	2	—	1
Humerus, diaph. & dist.	—	1	—	—	—	—	—	—	—	—
Patella	—	—	—	—	—	—	—	—	1	—
Fibula	—	1	—	—	—	—	—	—	—	—
Tarsals, astragalus	—	—	—	—	—	1	—	—	—	—
Metapodial, diaph. frags.	—	1	—	—	—	—	—	—	—	—
Phalanges, lst, prox.	1	—	—	—	—	—	—	1	—	—
— dist.	1	—	—	—	—	—	1	—	—	—
Indet. diaph. frags.	—	—	—	—	2	—	—	—	3	—
Ribs*	—	—	—	—	—	—	—	—	2	—

* Further material discarded in 1975

The Passage

Unit 3e Brownish-grey Cave Earth

The faunal material was concentrated in the lower part of the unit immediately above the hearth, and many bones were split. From the species represented (Table 12), one might suppose this to be a typical Middle Devensian hyena den assemblage, and the condition of many of the bones bears this out: there are eroded tooth fragments, and chunks of bone (perhaps woolly rhinoceros or horse) that have been heavily gnawed, leaving polished surfaces at either end. However, red deer is not generally associated in abundance with hyena in other Devensian assemblages and the red deer bones have not been gnawed, which suggests some admixture of later deposits.

Table 12. *King Arthur's Cave, faunal remains, Unit 3e (numbers of bones, teeth or fragments identified, not the estimated minimum number of individuals). (Key as Table 7.)*

	Hyaena	Bear	Mammoth	Woolly rhino	Horse	Red deer	Reindeer	Large bovid	Indet. med/large	Sheep	Hare
Antlers (incl.frags.)	—	—	—	—	—	—	6	—	—	—	—
Cranial frags.	—	—	—	—	—	—	1	—	—	—	—
Dentition	53	4	1	69	37	16	12	13	2	2*	—
Mandibular frags.	—	—	—	—	—	4	—	—	—	—	—
Scapula	—	—	—	—	—	—	1	—	—	—	—
Humerus, diaph.	—	—	—	—	—	—	1	—	—	—	—
Ulna, prox.	—	—	—	—	—	3	—	—	—	—	—
Radius, prox.	—	—	—	—	—	2	—	—	—	—	—
Rad/ulna, diaph.	—	—	—	—	—	1	1	—	—	—	—
Carpals	—	—	—	—	—	2	—	1	—	—	—
Metacarpal, prox.	—	—	—	—	—	2	—	—	—	—	—
Acetabulum	—	—	—	—	—	—	—	—	—	—	1
Tibia, prox.	—	—	—	—	—	2	—	—	—	—	—
Metatarsal, prox.	—	—	—	—	—	1	—	—	—	—	—
Metapodial diaph.	—	—	—	—	—	10	5	—	—	—	—
Metapodia, dist.	—	—	—	—	—	1	—	—	—	—	—
Tarsals, astragalus	—	—	—	—	—	1	—	—	—	—	—
Phalanges, 1st	1	—	—	—	—	—	—	—	—	—	—
— 2nd	—	—	—	—	—	1	2	—	—	—	—
— 3rd	—	—	—	—	—	1	—	—	—	—	—
Vertebrae, sacrum	—	—	—	—	—	—	1	—	—	—	—
Ribs	—	—	—	—	—	—	—	—	14	—	—
Indet. diaph. frags	—	—	—	4	—	—	3	—	34	—	—

* From top 10 cm, Unit 1/3e.1

Earlier Excavations — Main Chamber and Second Chamber

The provenances and identification of most of the material from the 1870-71 excavations are insecure and need systematic re-examination. From Table 6 it is of interest to note that bear is not reported from Cave Earth no. 2, but is present in Cave Earth no. 1, while the converse is the case for giant deer and bison.

ARCHAEOLOGICAL FINDS

Lithic Finds

Total lithic finds from the site are about 1000 pieces (Table 13). The finds from the 1871 excavations are mostly in Gloucester and Hereford museums, amounting to about 110 pieces (see Appendix F), but since no inventory survives, the presence of others elsewhere cannot be excluded. Very little of this material bears provenances. About 257 pieces (29%) of the UBSS finds, including 122 tools (56%), can be identified among material which survived the war-time destruction of the museum. These are supplemented by a valuable series of casts of implements. The extant material has been studied, and descriptions amended where necessary. For destroyed material the only sources of information are the reports and the pre-war catalogue (Manuscript Catalogue.). The illustrations (Figures 9-12, described in Appendix D) have been drawn from X2 photographs of original illustrations and drawings, or from surviving material.

Raw Materials

The great majority of material from all contexts is flint. Taylor (1928, p. 61) noted that flint in the Pleistocene layers 'was derived from at least two sources; the cortex of one group suggests the Chalk' . . ., the other from '. . . small well-rounded ochreous pebbles', both used for tools, but seemingly with 'no cores and not much waste. . .' In the post- Pleistocene layers, '. . . a poor cherty flint in badly battered nodules' was used, '. . . its cores and debris are plentiful.' Small much fissured nodules of flint occurred in the cryoclastic rubble of Unit 2. Chert was a very minor component, no more than 2% of the total. Most was black chert from the local Carboniferous rocks, but 4 specimens, from Unit 3e, Unit 2b and Unit 2d (2 specimens) were identified by Dr F.S. Wallis and Mr J.W. Tutcher as probably Cretaceous chert.

There were 9 specimens flaked in mostly unidentified hard rocks, including a retouched blade in adinole from Unit 3e (Figure 11, 17) and a flake retouched along the long edges (W.2.3.443), found in the old spoil heap with adherent red cave earth, presumably derived from Unit 3 or Unit 6.

Pebbles from the site, used as hammer stones, retouchers, polishers or otherwise worked or unworked, included Devonian sandstones, Lower Palaeozoic siltstones and mudstones and igneous rocks (identified by R.W. Sanderson).

Table 13. *King Arthur's Cave, Lithic Find Totals (2 flint nodules from Unit 2b not included). (OS = Old Spoil, FH = First Hearth, HM = Humus.)*

Context	Unit	Category Tools	Waste	Pebbles	Total Finds	Material Flint	Chert	Stone
1925-9 excavation								
Platform								
Humus	1	21	58	8	87	72	3	12
transition	1/2b	9	38	2	49	48	0	1
First Hearth	2b	62	256	18	336	313	2	21
FH+some OS/HM	2b(1/OS)	2	22	0	24	24	0	0
transition	2b/2c	1	3	0	4	4	0	0
Yellow Rubble	2c	21	43	1	65	61	1	3
Second Hearth	2d	27	44	3	74	66	4	4
Mammoth Layer	3c	8	7	0	15	14	1	0
Red Loam	3d	0	4	0	4	4	0	0
disturbed or uncertain	—	6	8	1	15	11	0	4
Old Spoil	0	20	53	4	77	66	1	10
mixed OS/HM/FH	0/1/2b	0	6	0	6	5	1	0
Totals		177	542	37	756	688	13	55
Alley								
White Cave Earth	2h	5	10	0	15	13	0	2
transition	2h/3g	1	0	0	1	1	0	0
Red Cave Earth	3g	0	1	0	1	1	0	0
Old Spoil	0	1	2	0	3	3	0	0
Totals		7	13	0	20	18	0	2
Passage								
Grey Cave Earth	1/3e.1	7	38	0	45	45	0	0
Grey Cave Earth	3e.2/3	21	33	0	54	50	2	2
Spoil/Grey Cave Earth	0/3e.1	3	5	0	8	8	0	0
Old Spoil	0	3	4	1	8	6	1	1
Totals		34	80	1	115	109	3	3
Other unprovenanced		6	5	0	11	11	0	0
Totals		237	707	57	1001	899	21	81
column as % of total		23	71	6	100	90	2	8

Technological and Typological Analysis

Given the imperfections in the data and the small size of assemblages from individual units, this analysis has necessarily been kept to a simple level. The technological classification counts blade segments as blades and core fragments as cores. The descriptions of surviving material indicate that the Manuscript Catalogue is normally reliable except that while entries by Hewer specifying 'blades' are usually correct, Taylor often catalogued what would now be called blades as 'flakes'. There is no way of correcting this bias, but inspection of the surviving

material confirms that all the assemblages, except for that from Unit 6 were dominated by blades rather than flakes. No detailed technological study has been attempted, but most surviving blade striking platforms are plain, with a single not entirely convincing example from Unit 2d (W.2.3.77) of a faceted platform, or 'talon à éperon' (Karlin 1983, Figure 180), noted by Jacobi (1991) as characteristically present in 'Cheddarian' assemblages such as that from Gough's Cave. The pebble and nodule categories comprise unworked material; worked pebbles are counted among miscellaneous tools. The typological analysis follows Campbell (1977).

The Unit Assemblages

These are summarised in Table 14. Salient features are noted below, descriptive details are given in Appendix D. Because of the uncertainties as to provenance the 1871 material has not been subdivided, although the tools mostly appear to be later Upper Palaeolithic, apart from the exceptions noted below. The figures for the incidence of burnt material rely on the Manuscript Catalogue. The highest incidence is for the second hearth, Unit 2d, the first hearth (Unit 2b) has a low incidence, the third hearth, Unit 3e.2, none. Because of the damage caused by the 1940 fire, no useful figure can be given for the presence of cortex on items, nor has weighing been undertaken.

Unit 0

Figure 11, 26-30: Taylor compared the 'very dense, slightly smoky patina' of no. 26 to that of artefacts from the cave earth, i.e. Unit 3e, suggesting that it might derive from earlier occupation. Campbell does not illustrate any parallel among Late Upper Palaeolithic assemblages, but Jacobi does not consider it a Mesolithic adze. Nos. 27-9 could all be Later Upper Palaeolithic, while no. 30, a 1958 find in old spoil at the north-west corner of the excavated area on the platform, is perhaps Beaker.

Unit 1

Figure 9, 1-3, 7-14: total artefacts 126, tools 30 (24%); only 1 core. The leaf arrowhead, no. 1, is probably earlier Neolithic, the barbed-and-tanged arrowheads, nos. 2 and 3, are probably Beaker (4 and 5 are from the Passage, 6 of unknown provenance). The two plano-convex knives, nos. 7 and 8, and the scrapers, 13 and 14 are probably also Beaker, as is also a Symonds find (Garrod 1926, Figure 12, 2). Two retouched bladelets, saws or notched blades, and scrapers and blades, nos. 9-12 probably come from the Mesolithic occupation in the First Hearth.

Unit 2b

Figure 9, 16-50: total artefacts 346, tools 65 (19%); 4 cores, also a crested blade (Taylor 1928, Figure 5, 16), and blade and bladelet waste. The worked pebbles from Unit 2b included a small waisted pebble, a retoucher, pebbles with rubbed facets, hammer stones and possible polishers (Taylor 1928, Plate IIIb, 2-4, 8-10). The occurrence of scalene triangles, nos. 21 and 22, rod microliths, no. 28, and

Table 14. *King Arthur's Cave, typological analysis of the lithic assemblages.* (**Mam.** = Mammoth).

Area		U.B.S.S. Excavations 1925-9											1871	1925-32 (Grigg)	
		The Platform						Alley Passage							
Context		Humus	First Hearth	Yellow Rubble	Second Hearth	Mam. Layer	Other Ctxts	All Units	Cave Earth		Old Spoil	All Finds	All	1925 -1932	All Finds
Unit		1	2b	2c	2d	3c		2h+3g	3e.1	3e.2/3	0	Totals		?	Totals
Tools	Retouched blade	6	13	11	4	3	1	0	1	7	2	48	1	2	51
	Retouched flake	3	3	1	4	2	0	1	0	0	3	17	0	0	17
	Knife	1	1	1	3	1	0	1	1	2	2	13	0	0	13
	Scraper	6	5	4	3	0	2	1	3	1	4	29	3	1	33
	Scraper/Burin	0	0	0	0	0	0	0	0	0	2	2	0	1	3
	Burin	0	3	0	4	0	0	0	0	1	2	10	2	1	13
	Point	0	1	1	1	1	0	1	0	1*	1	7	4	0	11
	Borer/Awl	0	2	1	2	0	0	0	1	1	1	8	1	0	9
	Saw/notch	3	1	0	0	0	0	0	0	0	0	4	0	0	4
	Retouched Bladelet	2	27	0	1	1	0	0	0	7	0	38	0	0	38
	Arrowhead	3	0	0	0	0	0	0	2	0	0	5	0	1	6
	Miscellaneous	5	6	1	0	0	3	2	1	1	6	25	2	0	27
	Retouched frag.	1	3	1	5	0	0	0	1	0	1	12	0	0	12
	Total tools	30	65	21	27	8	6	6	10	21	24	218	13	6	237
	Tools as % of total	24	19	33	38	53	33	35	19	39	27	26	16	55	25
Waste	Blades	17	45	3	9	0	4	1	5	1	7	92	20	1	112
	Bladelets	5	16	0	0	0	1	2	1	0	7	32	0	0	32
	Flakes	21	52	13	11	2	3	6	6	0	10	124	12	1	137
	Cores	1	4	0	0	0	0	0	0	0	1	6	0	2	8
	Burin spalls	0	2	0	1	0	0	0	0	0	0	3	0	0	3
	Spalls & chips	3	72	2	9	0	1	0	0	3	3	93	3	0	96
	Fragments	49	90	25	14	5	3	2	31	29	37	285	32	1	318
	Total waste	96	281	43	44	7	12	11	43	33	65	635	67	5	707
	(Utilised)	6	30	29	6	0	0	0	0	1	3	56	2	0	58
Totals — tools + waste		126	346	64	71	15	18	17	53	54	89	853	80	11	944

* 1 leaf-point from Unit 3e.1

a possible partial Sauveterrian point, no. 30, suggests a date for this Mesolithic assemblage after c. 8,500 yr BP, while the absence of short lanceolates, semi-circles and micro-trapezoids could argue a date before c. 7,000 yr BP (R.M. Jacobi). The general character of the microlithic armatures finds a reasonable parallel in the *Sauveterrian à denticulées moyen II* of the Paris basin (Hinout 1992, Figure 13), dated to the late Boreal. Among Symonds' finds a scraper (Garrod 1926, Figure 12, 5) may be attributable to this assemblage. A plano-convex knife (Figure 9, 17) is of Beaker type.

Unit 2c

Figure 10, 1-20: total artefacts 64, tools 21 (33%); no cores. The lithic assemblage is of Upper Palaeolithic type, and includes knives, scrapers, including a short end-scraper, no. 12, no burins, but a burin spall, no. 19. Convex-backed points, nos. 1 and 2, and straight-backed blades, nos. 4 and 7-10. There are no Creswell points, but a broken obliquely truncated point, no. 3, might be part of one. Taylor's comparison (1928, p. 74) of the side scraper, no. 14, to Creswellian pieces from Mother Grundy's Parlour is kindly corroborated by Dr R.M. Jacobi (in litt.) .

Unit 2d

Figure 10, 21-36: total artefacts 71, tools 27 (38%), no definite cores, but the crested blade, no. 27, is a waste product of blade core preparation. The flint is poor, with no intensive flint working, although the group were bringing to the site quite large cores for blade making. The angle-backed blade, no. 21, was possibly a Creswell point. There are knives, scrapers, including a snapped end-scraper, no. 30, burins, backed blades reworked as gravers, nos. 32 and 33, and awls. The awl ('twist-drill'), no. 35, is closely comparable to finds from Goughs Cave, spits 12-16 (Campbell 1977, Figure 124, 4). A slate pebble from the unit showed slight pitting, perhaps by use as a hammer stone (Taylor 1928, Plate IIIb, 5). No. 29 could perhaps be classified as a 'raclette' as also might nos 15 and 18 from Unit 2c. These occur characteristically in Magdalenian assemblages.

Taylor noted that no. 31 could be matched among scrapers from Paviland Cave, attributed to the (Middle) Aurignacian, though he regarded the parallels as illusory since he believed the implement was 'almost certainly not derived' (Taylor 1928, p. 78). The presence of no. 36, classifiable as a polyhedral burin, compared by Jacobi (in litt.) to an unpublished burin from Fynnon Beuno (Gwynnedd), a cave with Aurignacian style artefacts, does however suggest that this unit contained a derived Aurignacian component.

Unit 3c

Figure 10, 37-40: total artefacts 15, tools 8 (53%); no cores. The fragmentary straight-backed blade, no. 37, the convex-backed blade, no. 39, very like one from Ogof-yr-Ychen, Caldey (David 1991, Figure 14.8, 6), and the long nibbled blade, no. 40, compared by Taylor to material from Gough's Cave (cf Campbell 1977, Figure 134, 4), are all clearly Late Upper Palaeolithic. On account of no. 39's non-lustrous patina, unlike the milky white lustrous patina of other artefacts from

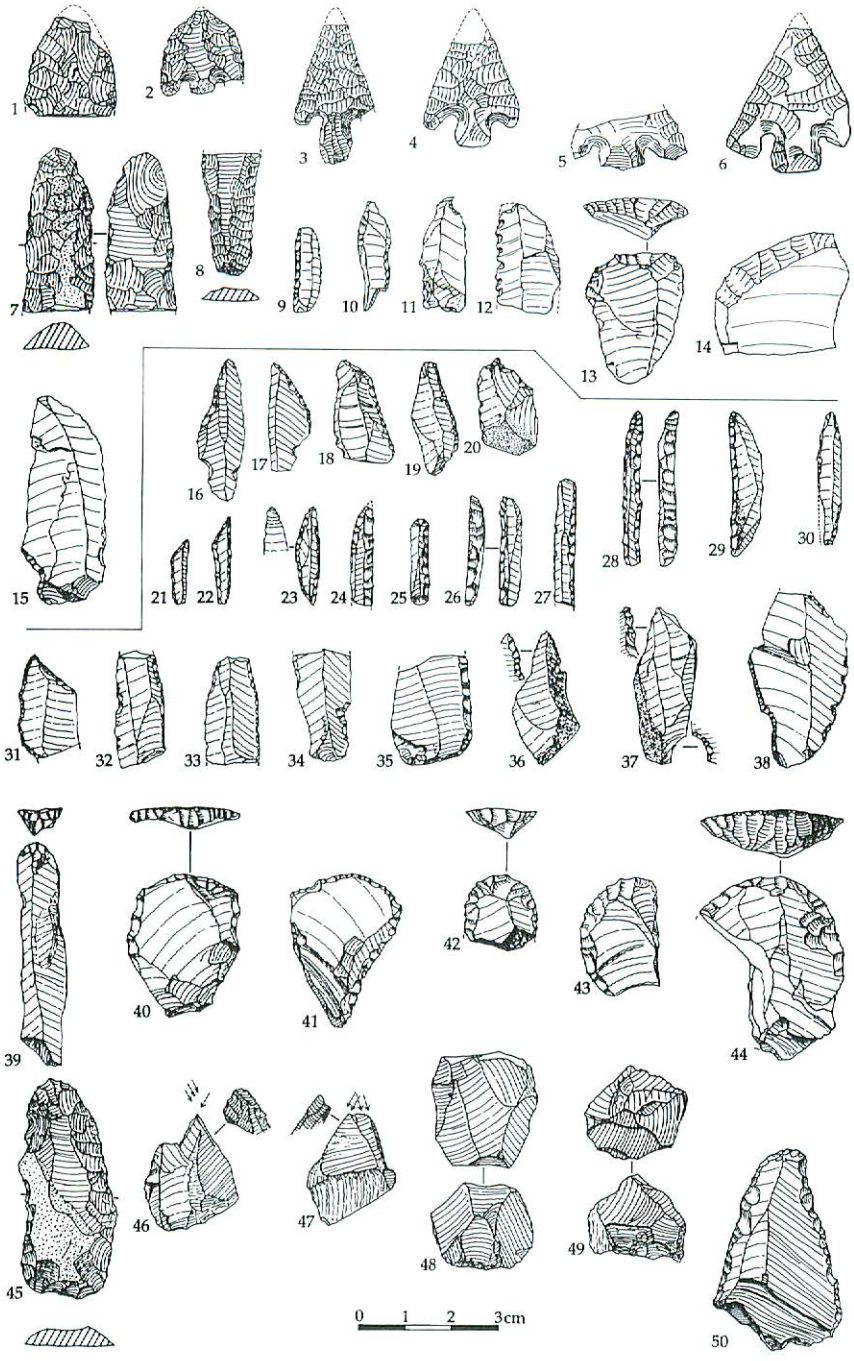

Figure 9. *King Arthur's Cave, flint artefacts: 1-15 from the humus layer (Unit 1) on the Platform and the superficial layer (Unit 3e.1) in the Passage; 16-50 from the First Hearth (Unit 2b).*

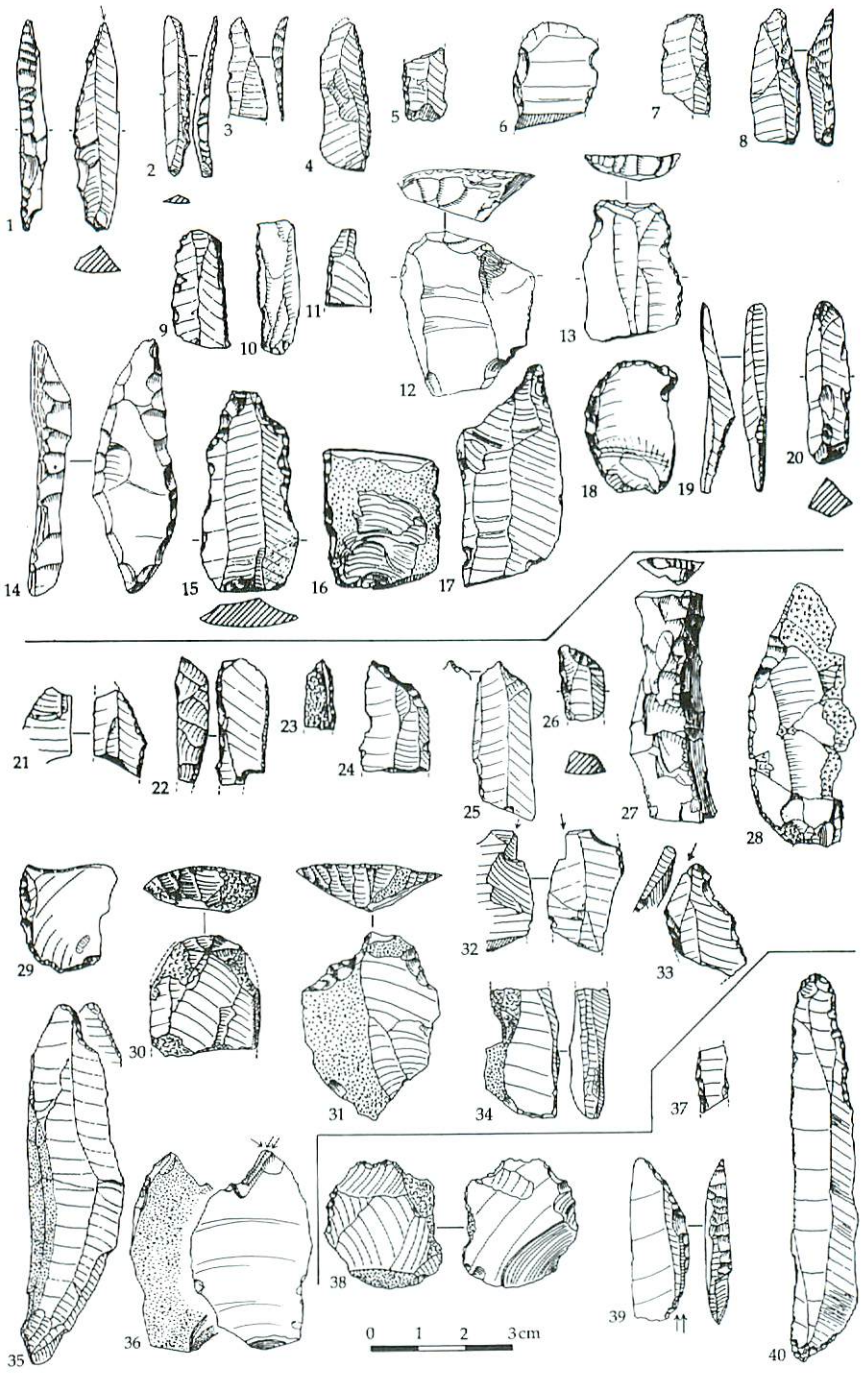

Figure 10. *King Arthur's Cave, flint artefacts from the Platform: 1-20 from the Yellow Rubble (Unit 2c); 21-36 from the Second Hearth (Unit 2d); 37-40 from the Mammoth Layer (Unit 3c).*

the Mammoth Layer, Taylor suggested that it might have been trodden down from the Second Hearth after partial patination. The vertical position in which no. 40 was found suggests that it had been displaced downwards. No. 38 appears to be a used core-preparation flake.

Unit 3d

Not illustrated: total artefacts 4, no tools, all waste with nothing technologically distinctive.

Unit 3e.1

Figure 9, 4-5, Figure 11, 3-7: total artefacts 53, 10 tools (19%). Finds include two barbed-and-tanged arrowheads (Figure 9, 4-5). The scraper, no. 3 was compared to Mendip surface finds, probably Mesolithic.

Unit 3e.2

Figure 11, 8-25: total artefacts 54, 21 tools (39%). The backing of no. 10 is vertical, the flint of 11 is completely altered to a chalky texture; 12 and 13 are perhaps spalls rather than microliths.

No. 22 is part of an unifacial leaf-point, which had snapped on impact, the bending force having been applied from the dorsal face. Such leaf-points, with trimming of the proximal and distal ends of the bulbar face to facilitate their use as hafted spear points, are characteristic of the Lincombian leaf-point tradition of the earlier Upper Palaeolithic (Campbell 1980; 1986). A radiocarbon date of 34,500 ± 1,400 yr BP (OxA-1620; Hedges *et al.* 1989, 123) is now available for a similar unifacial leaf-point from Bench Quarry Cavern, Brixham (Campbell 1977, Figure 97, 1), and radiocarbon dates reported for Soldiers Hole (Hedges *et al.* 1991, p. 123) are compatible with a similar age for the bifacial leaf-points from there.

No. 10 is evidently Later Upper Palaeolithic, and nos. 8, 9, 11 and 17-19, may also be. The small backed blades and bladelets, nos. 15-16, 20-21 and 23-4, and particularly the obliquely truncated microlithic point, no. 14, are probably Mesolithic.

Unit 6

Figure 12, total artefacts possibly 5, no tools. Garrod (1926, Figure 12, 4-7) published four implements said to be from Unit 6, but 4, 6 and 7 are typologically Later Upper Palaeolithic and there is no reason to separate them from the series from Units 2c, 2d and 3e (5 might be Mesolithic). They cannot have been found in Unit 6 if the circumstances of the excavation were as stated. The attribution to Unit 6 originates with Thacker (1912), who believed he could distinguish between implements from the Upper and Lower Cave Earths on the basis of patination, but he was clearly mistaken.

None of the extant finds are provenanced to this unit, but 2 flint waste flakes (Figure 12, 1-2) and 3 chips in Gloucester Museum (Appendix F, A.3159) fit Symonds' description (1871, p. 437) in that they are deeply white-patinated and physically unworn. Both flakes will have had platform angles of about 90°. The first flake gives evidence of successive flaking of its core on two axes at right

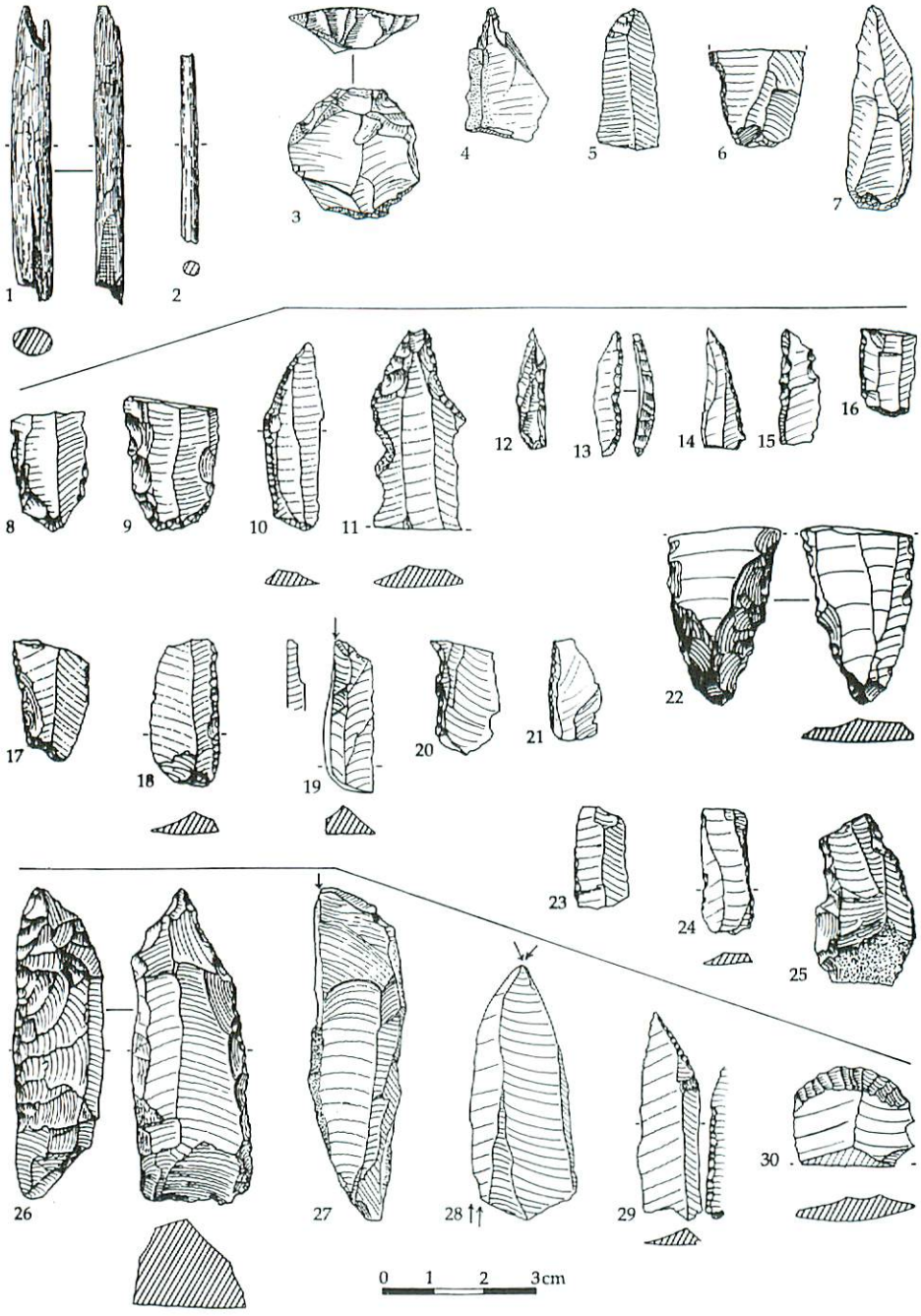

Figure 11. *King Arthur's Cave, bone and flint artefacts: 1-25 from the Brownish-grey Cave Earth (Unit 3e) in the Passage (1, 3-7 from Unit 3e.1, 2, 8-22 from Unit 3e.2, 23-25 from Unit 3e.3); 26-30 from spoil dumps outside the cave.*

angles, the second shows recursive flaking on nearly the same axis. Although not a Levallois flake as defined by Bordes (1980), it has a faceted platform. Similar faceting can be found on platform trimming flakes from blade cores, but developed blade technology and similar flaking patterns are now known in the later Middle Palaeolithic immediately across the English Channel, as for example in the industry from Saint-Germain-des-Vaux (Manche), dating probably from the beginning of the Weichselian (Cliquet and Revillon 1992). It can be suggested that the character of these flakes and their large size as compared to the Upper Palaeolithic material from the site are compatible with their being Middle Palaeolithic.

Other Finds

Bone and Antler

Both the pieces illustrated (Figure 11, 1-2) are from Unit 3e. No. 1, of which the lower end shows an oblique bevel cut short by the break, is probably a broken bone point, whereas no. 2 is more likely to have been a needle; both are probably Palaeolithic. No. 1 was originally published as engraved with an eel ("fish"), however, in 1937 Breuil thought the supposed engraving due to tooth and root marks. He identified the material of no. 2 as ivory.

Other artefacts of bone and antler included two pierced sow canines, one from Unit 2b (Taylor 1928, Plate IIIa, 1), and one from Unit 3e in the Passage (Hewer 1926, Figure 3, 15); and part of an engraved bone finger ring, not extant, but then thought to be Romano-British, from Pit 2. Taylor (1928, Plate IIIa, 2-6) illustrated five further bone fragments thought to be artefacts, including 2, a piece of rib with dentated end from Unit 2b, and 5, a polished slip of bone with two large circular perforations, one broken, from Unit 2d. Surviving bone fragments queried as artefacts all seem to be products of gnawing and digestive erosion by hyenas and other carnivores.

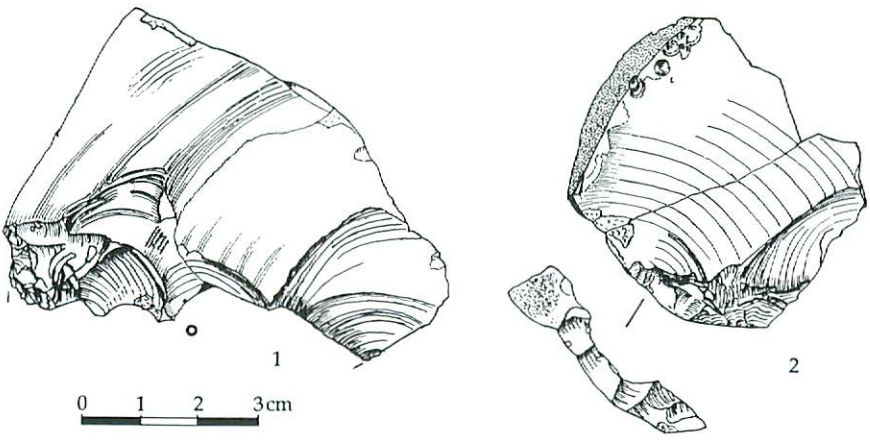

Figure 12. *King Arthur's Cave, flint flakes probably from Unit 6.*

Pottery

A total of 84 sherds was found, of which 11 were Beaker, 5 Iron Age, 32 Romano-British, 23 Post-Medieval and 13 indeterminate. The Beaker sherds included comb-decorated fragments and 3 from the same Beaker. The Romano-British sherds were perhaps mostly 3rd-4th century. Sherds found stratified are mostly from Unit 1, but there was a group of Romano-British sherds from Unit 3e.1 in the Passage. The sherds from Units 2b, 2c and 3e.2 were mostly small and indeterminate and found where there appeared to be disturbance or contamination from later deposits. None of this material merits individual publication here.

The only other finds recorded are a bronze pin attributed to the 18th century, from the superficial material in the Passage and part of a pewter spoon from the Humus on the Platform. Pieces of clay tobacco pipes were found in the old spoil dumps.

INTERPRETATION AND DISCUSSION

Chronological and archaeological correlatives for the units present in King Arthur's Cave are summarised in Table 15, and discussed in detail below.

Mid-Devensian and Earlier Deposits

In the Main Chamber, Unit 4 is the earliest deposit. It is a fine grained water-lain deposit emplaced by the active swallet stream prior to abandonment of the sink complex, as indicated by the presence of allochthonous clasts of dolomite, quartzose sandstone and grey shales. Subsequently the sediments were cemented by percolation waters under relatively warm humid conditions. However these cements and the calcareous component of the deposit has been leached by more aggressive water under cool humid conditions. The extent of this leaching is very substantial, and it has also affected the cave walls, releasing iron from the mineralised limestones and giving an intense red colouration. Symonds described Unit 4 as stratified, and given the probable mode of emplacement by ponding in a swallet cave, the upper surface of the deposits would be expected to be horizontal or slope gently inwards. In fact it slopes out towards the present entrance, suggesting that erosion of the sediments has occurred. This may have been contemporaneous with the leaching. Local percolation water is unlikely to be sufficient in quantity to explain either the leaching or erosion, nor does the outward sloping erosive surface suggest sapping into the downstream part of the cave by renewed activity of the swallet stream. It seems more probable that during cool but wet (?snowy) periods, when surface runoff occurred in the dry valleys, water entered the cave from the Attic and possibly the Alley from the dry valley above and to the east of the cave. The observed gradient of the vadose trench from the Attic supports this contention.

As discussed above, we are unable to constrain adequately the age of the earlier

Table 15. *Chronological correlatives of units in King Arthur's Cave.*

King Arthur's Cave		Britain (Bowen 1989)	kyr	North-West Europe (Behre 1989)	Chrono-zone	Deep Sea ^{18}O Stage
Unit	Archaeology					
1	Beaker etc.		c. 4.2			
2a 2b	Mesolithic	Flandrian	c. 7.5	Fl	Fl	1
		Dev-L		(We-L)		
2b	none	Loch Lomond St (transition)	c. 10.5	Dryas III	III	
				Allerød Int	II	
2c	B.P.C.			Dryas II	Ic	
2d	S.P.C.	Windermere Int				
				Bölling Int	Ib	
				Dryas I	Ia	
		Dev-P		(We-P)		
gap	none	Dimlington St	c. 26-13	Brandenburg St		2
?	Aurignacian		c. 32-28(+4)	Denekamp ┐		
3e.2	Lincombian			├ IP		3
3c				┘		
3d	?	Upton Warren Int?	c. 39-36(+4)	Hengelo		
5?			c. 45 (+4)			
6?	Middle Palaeolithic?	Dev-E		(We-E)		
		Brimpton Int	c. 79	St Germain II		5a 5b
		Chelsford Int	c. 99	St Germain I		5c 5d
		Ipswichian	c. 130-111	Eemian		5e

B.P.C. = Backed Point Complex S.P.C. = Shouldered Point Complex
Fl = Flandrian, Dev = Devensian, We = Weichselian, L = Late,
E = Early, St = stadial, Int = Interstadial, IP = Inter-pleniglacial

deposits (Units 4, 5 and 6) in the cave, other than to indicate that they were deposited prior to c. 39,000 yr BP. The sediments of Units 5 and 6 appear to have been deposited in a vertical fissure or pothole which had been abandoned by the formative stream, perhaps by switching of flow to the lower routes in Main Chamber and The Passage. Only limited sediment thus entered the cave by wash and colluviation, the interstratification of thin layers of speleothem suggesting intermittent deposition over a considerable period of time. The mammalian fauna reported is suggestive of a cool, mainly open environment, as during the early Devensian. The flint flakes from the unit are probably Middle Palaeolithic as surmised by Campbell (1977,

v. I p. 44). The more substantial speleothem of Unit 5, with its implication of milder, more humid conditions, may be correlated with one of the earlier Devensian interstadials as recorded in the speleothem growth frequency peaks of Baker *et al.* (in press), perhaps peak D, c. 40 ka or the sustained peak, Fl-F2, c. 48-60 ka.

The Middle Devensian Deposits and Their Archaeology

Unit 3 comprises an 'internal' facies with significant carbonate clasts (Unit 3a Main Chamber) which passed laterally into a finer grained 'external' facies on the Platform (Unit 3d). The soil micromorphology of samples from the finer grained facies suggests the presence of a significant wind-blown component, but there is also evidence for the incorporation of earlier cave earth material including phosphatised coprolitic material. This may possibly derive from Unit 4, but could also be contemporary and from Unit 3a within the cave. Overall the upper surface of Unit 3 slopes upwards to the rear of Main Chamber (Figure 7) suggesting emplacement from this direction. However, it is not known if this is a depositional surface or due to subsequent erosion as no internal stratification is preserved. Some of the clasts in Unit 3a are locally derived from the cave roof and walls, but there is a significant component of allochthonous material which must have entered from the inlets in the Attic and Alley. Overall, increased sediment availability (including windblown material) and mobility at the surface is indicated. The evidence therefore suggests cold dry conditions with reduced vegetation cover permitting slope wash and transport into the cave mouth, with frost action on bare rock surfaces. The increased aeolian component may possibly be associated with lowering sea levels in the Bristol Channel. The termination of Unit 3 represented by the Mammoth Layer (Unit 3c) saw a return to cooler conditions with less sediment transport, and this trend is confirmed by the presence of dusty clays infilling the pores of the underlying sediments.

The faunal evidence clearly suggests that the cave was used by hyenas, the radiocarbon dates placing the occupation in the mid-Devensian, perhaps in the equivalent of the Hengelo interstadial. Presumably scuffing and digging by hyenas was partly responsible for the incorporation of the faunal remains in the deposit. The few flint artefacts indicate a minimal human presence, possibly contemporary with the faunal remains, as indicated by the occurrence of burnt bone which was found well down in the unit. Indeed, for Unit 3c, the Mammoth Layer, the artefacts suggest only occasional or even a single human visit. However, it should be noted that the distinctive artefacts are of later Upper Palaeolithic facies, and it is therefore probable that this material was either originally deposited on the surface of the layer at a much later date, or is derived from the layer above (Unit 2).

We have noted above that Unit 3e in the Passage should almost certainly be split into two; Unit 3e.1 (the upper part) includes Beaker, Mesolithic and Late Upper Palaeolithic artefactual material, ungnawed red deer and reindeer bones, and also sheep. It is thus comparable with Unit 2 discussed below. In contrast, the lower Unit 3e.2/3 which includes Hearth 3 contains a typical hyena den faunal component, and a broken Lincombian leaf point favouring a date within the bracket 37-32,000 yr BP. However, Unit 3.2 also included Late Upper Palaeolithic artefacts,

bladelets and a tooth pendant thought to be Mesolithic, although these flints were reported as scattered through the deposit, rather than concentrated at the level of the hearth, as well as ungnawed red deer and reindeer bones. The later faunal remains and Late Upper Palaeolithic and Mesolithic artefacts could have infiltrated through superficial disturbance of the shallow unconsolidated cave earth.

The circumstances might best be explained by postulating a brief Lincombian occupation, associated with the hearth and the broken leaf-point, and followed by the hyena activity. In favour of this is the concentration of the faunal remains in a zone immediately above the hearth, though the assertion that long bones 'had been split longitudinally by human agency and afterwards gnawed by hyenas' (1926, 227), is unconfirmed. The preservation of macroscopic charcoal pieces in the hearth could be explained by the lack of intensive activity, or by deliberate burial. It is possible in view of the dates from Units 3c and 3d that the human visit took place before deposition of the Mammoth layer was complete.

The single snapped Lincombian leaf-point at King Arthur's Cave accords with most such similar finds in an area extending from Poland to Britain, being from hunters' camps with a restricted range of artefacts, with base camps virtually unknown (Allsworth-Jones 1987; Kozlowski 1988). There is little record of hearths from sites of this age in Britain, and very little to suggest woodland. The fuel probably came from dwarf birch and willow scrub which are likely to have flourished along the Wye and on its sheltered south facing valley slopes. It has recently been suggested that carrying broken spearheads back to a camp for replacement implies use of a kit of spearheads already hafted in light foreshafts, since it is difficult for a hunter to handle more than one heavy throwing spear in a hunt (Solecki 1992, p. 210).

The Mid Devensian to Late Devensian Hiatus

As discussed in the summary of stratification, there is a major break in stratification between Unit 3 and Unit 2, with the locus of maximum deposition shifting from within the cave to the cave mouth, and the sediments becoming almost wholly locally derived. This hiatus is confirmed by the radiocarbon dates which show a gap of some 22,000 years between the deposits of Unit 3 and of Unit 2, covering the later part of the Devensian Inter-pleniglacial, the glacial maximum (Dimlington Stadial), and the earlier part of the Late-glacial. Since this interval must have included phases of periglacial climate with cryoclastic erosion, translocation of slope deposits and wind transport of loess and coversand, it seems highly probable that there were once intervening deposits in the cave and on the platform which have been removed by later erosion.

Transport of material out of the cave mouth is suggested by the outward slope of the surface of Unit 3a in the Main Chamber. Increased precipitation and the disappearance of permafrost during the Windermere Interstadial, may have facilitated such erosion by increasing the flow of water entering the cave from above, notably via the Attic and Alley.

The recovery from Unit 2d of artefacts attributed to the Aurignacian supports the suggested removal of intermediate deposits, since dates from France and

Belgium (Dewez 1989) suggest that it appeared in Western Europe after c. 34,000 yr BP, the date available for Unit 3c. Presumably the Aurignacian artefacts were exposed on the eroded surface of the deposits to be picked up and then discarded by the Late Upper Palaeolithic visitors to the cave. The presence of a scraper and a burin show that the Aurignacian visit or visits involved maintenance activities as well as hunting, in contrast to the Lincombian episode which may have been no more than a single brief visit by a hunting party.

The Late Devensian Deposits and Their Archaeology

It is clear that the accumulation of the clean cryoclastic breccia of Unit 2, which occurred predominantly on the Platform, can best be interpreted in terms of disaggregation of the Crease Limestone of the cliff face above the cave mouth. A climatic regime with frequent winter temperature fluctuations around freezing, but not particularly cold is implied (see recent discussion in Toussaint and Becker 1992). The absence of a colluviated or wind-blown component suggests that there was unbroken vegetation cover in the vicinity, perhaps including closed woodland. Radiocarbon determinations at two standard deviations of 12,450-11,970 yr BP for Unit 2d and 12,360-11,880 yr BP for the lower part of Unit 2c date their deposition to the Late-Glacial Windermere Interstadial. Although the tabulations in Burdukiewicz (1986, Figure 67) and in Barton *et al.* (1991), suggest attribution to its earlier warmer phase, chronozone Ib, the Bölling Interstadial of the north-west European sequence, for other authors these dates might suggest the succeeding cooler phase, chronozone Ic, the Dryas II phase (cf Cordy 1991; Julien 1983, Toussaint and Becker 1992, Figure 4; Peacock 1992).

Leroi-Gourhan (1986) has determined pollen samples from the cave earth/breccia unit at Gough's Cave dating from this time, as including from 8-10% tree pollen of alder, hazel and birch; while closed birch woodland has been inferred at Llanilid in south Wales between c. 11,700 and c. 10,500 yr BP, with an earlier woodland episode between 12,500 and 12,000 yr BP recognised in north-west England (Walker and Harkness 1990). Discussion by Barber and Twigger (1987, p. 224-5) can be used to suggest that the south-facing slopes in the vicinity of King Arthur's cave would have had insolation values substantially above general levels, so that local birch woods on those slopes and in the dry valley would have been likely within the period 12,500 to 10,400 yr BP.

The knives, scrapers, burins and awls from Unit 2d suggest a wide spectrum of maintenance activities, while the backed blades reworked as gravers suggest expedient use of broken items of equipment. In Unit 2c the number of tools is less and there are no burins, which might suggest shorter visits with less maintenance and consequential discard. The straight-backed and curved-backed pieces bring this series within the definition of Backed Point assemblages, generally thought to become common early in chronozone II, the Allerød interstadial (see eg Burdukiewicz 1986, p. 193-5). David's comparison (1991, p. 156) of these backed blades from Unit 2c to blades from Tjongerian assemblages is relevant here, as is comparison with the white patinated implement series from Belloy-sur-Somme (Fagnart 1991, Figure 20.5). Thus it is likely that human activity at the site continued

into the early part of chronozone II, although the absence of Elk from the fauna suggests that the site was abandoned thereafter.

Assuming that deposition of cryoclastic debris ended with rapid climatic amelioration shortly before 10,000 yr BP (cf David 1991, 157; Peacock 1992), the virtual absence of Upper Palaeolithic artefacts from Unit 2b, the uppermost zone of breccia, suggests that the site was unoccupied during the later part of the Allerød phase and the cold Dryas III phase at the end of the Late-Glacial (chronozones II and III). Clearly the artefacts and radiocarbon dates offer no support to Campbell's (1986) suggested attribution of the assemblages from Units 2c and 2d to a Final Creswellian dating to chronozone III, the Youngest Dryas stadial, c. 11-10,000 yr BP, while the material from the upper part of Unit 2c lacks the large bruised blades seemingly characteristic of assemblages of around 10,000 yr BP (Barton 1991).

There is equally no longer any reason to follow Campbell in his attribution of backed blades from Unit 3e.2 (Figure 11, 18, 24; his 1986, Figure 10, 4-5) to a hypothetical Lower Creswellian. The basis for this hypothesis, which proposed an origin in the much older Upper Perigordian or Gravettian, has been destroyed by the recognition that there is no longer evidence for dating Hamburgian sites earlier than the Bölling Interstadial (Burdukiewicz 1986, 19, 51-2), at the same time returning attention to the question of Upper Magdalenian sources for both Hamburgian and Creswellian. It is clear from the discussion above that it would be unsafe to take the presence in the deposit of the mammoth-rhinoceros-hyena fauna as indicative of an early date for these artefacts. Burdukiewicz's cluster analysis of the northwest European 'Shouldered Point Assemblages', in which British Creswellian sites constitute Group IV, places King Arthur's Cave in his south-western sub-group 1, his 'Creswell point phase', along with Kent's Cavern, Hoyles Mouth and Gough's Cave (Burdukiewicz 1986, p. 49). Campbell's observation that this unit (his A3c) has no Creswell points is irrelevant here, for although the presence of a Cheddar point (Figure 11, 10) might suggest a slightly earlier episode than those represented by Unit 2d, this is not likely to have been earlier than the Gough's Cave group.

The 'Creswellian' from King Arthur's Cave will thus have been broadly contemporary with assemblages from Gough's Cave and Mother Grundy's Parlour, with Upper Magdalenian assemblages in the Paris Basin, such as Pincevent, and in Belgium (Bosselin and Djindjian 1988) and with Hamburgian assemblages in northern Germany and the Netherlands. Bone points like Figure 11, 1, seem very rare within the Creswellian; the only one listed by Campbell (1977, Figure 143, 3, his type II CB1, from Church Hole, Holbeck, Notts.) has concave truncations at both ends and is not like the King Arthur's find. However points (*sagaies*) with single bevels occur in most phases of the Magdalenian, so that this find can be seen as another example of the occurrence of Magdalenian style bone and antler work in Creswellian assemblages. The suggested identification of 'raclettes' in Units 2d and 2c is perhaps a further small contribution to the task of elucidating possible relationships between Creswellian and Magdalenian.

The distinction between a 'shouldered point' assemblage in Unit 2d and a 'backed point' assemblage in Unit 2c provides some support for Jacobi's suggested

dismemberment of the British Creswellian (1991, p. 37-8). These two series are augmented by the tools of Creswellian facies from Unit 3e, from Symonds' excavation and Grigg's collection, and from the old spoil heaps. If it were possible to allocate these between the phases represented by Units 2c and 2d, or even to a phase not represented on the Platform, some of the inferences drawn above might need modification.

The Holocene Deposits and Their Archaeology

The ending of cryoclastic deposition on the Platform was presumably followed by reduced rates of accumulation, and weathering of the surface of Unit 2, until this was covered by accumulating humus in wooded conditions, beginning in Pre-Boreal time, perhaps c. 9,700-9,500 yr BP. Subsequent humic accumulation and infiltration and weathering of the upper part of Unit 2 may have continued throughout the Holocene. Indeed Currant suggests that infiltration of micro mammal bones from Unit 2b into Unit 2c has probably occurred, although the comminuted nature of the deposits prevented translocation of the larger bones and artefacts. In late Boreal time, after c. 7,500 yr BP, there was a significant change, when intensive Mesolithic activity locally removed the humic soil (Unit 1) and disturbed the upper part of the breccia. This occupation was buried by renewed deposition, perhaps interrupted by lighting of fires and other disturbance during the Beaker phase around 2,300-2,000 yr Cal-BC. Later Romano-British and post-medieval activity on the Platform seems not to have disturbed the soil. The absence of superficial colluvial deposits suggests that the wooded slopes above the cave may never have been permanently cleared or cultivated.

The later Mesolithic occupation of Unit 2b occurred in a stable, essentially maritime, broad-leaved woodland environment. The pattern of use may have returned to something closer to the pattern of Unit 2d, though with rather more intensive occupation and varied activities. The assemblage indicates flint working on site using imported flint, though some nodules may have been locally available. The presence of scrapers and gravers suggests maintenance activities. Despite the extent and thickness of this layer and the apparent evidence for extensive hearths, the lithic assemblage is minuscule by comparison with many Mesolithic sites indicating relatively low lithic artefact production, refurbishment and discard on site.

The single broken leaf-shaped arrowhead of Unit 1 suggests a visit by hunters or herders in the earlier Neolithic, but there is nothing else which need be of this age, though another arrowhead is recorded from the valley in front of the cave (R.C.H.M. archive, SO 51 NW, 12). The barbed-and-tanged arrowheads attest a Bell Beaker presence and the planoconvex knives, the scrapers, and the presence of a few sherds of pottery suggest occasional visits by hunting parties or herders, rather than continuous Beaker occupation. The few fragments of human skull found may relate to the two burials said to have been found by Symonds, which could have been of Romano-British age. Some bladelets and blades probably belonged to the Mesolithic occupation.

Butchery and Function at King Arthur's Cave

Allowing for known discard of rib fragments and other 'unidentifiable' specimens in 1975, the presence of cranial fragments, dentition, vertebrae, pelves, and upper and lower parts of both limbs among the remains of red deer from Units 2b, 2c and 2d, suggests, that these animals were brought to the site as either complete or only partially dismembered carcasses for butchering. The sesamoid bones and phalanges are particularly significant here as ethnographic study shows these are characteristically discarded in coarse butchering (cf Grønnow *et al.* 1983, Figure 85). The comparative scarcity of cranial material and of antler might suggest that the heads had mostly been removed already, although the same ethnographic evidence suggests that these parts may be dumped on the periphery of the occupied area. The same was probably true for the red deer and the reindeer material from Unit 3e. To these should be added smaller numbers of aurochs and roe deer from Unit 2b and occasional horses from Units 2c and 2d.

The large amounts of fire debris and split bones from Unit 2d imply eating of bone marrow, as well as meat from pelvic bones, scapulae, vertebrae and ribs. This suggests a hunting camp. In terms of Binford's 'Modified General Utility Index' (Binford 1978; Legge and Rowley-Conwy 1988) portions of medium utility were consumed on site and portions of higher utility taken away. Perhaps a family group or groups were making repeated visits, constructing some form of shelter, eating much of the meat obtained and maintaining a fire or fires within or at the entrance to the cave (cf Gentles and Smithson 1986). It is however a serious lacuna in the evidence that there is nothing in the lithic assemblage from this or the other units discussed which is obviously suited to chopping bones. A further deficiency is the lack of any evidence as to seasonality of use of the cave.

For Unit 2c the absence of hearth debris indicates a change in function. Although butchered bone is present so that there was still some consumption, less medium utility material was discarded, so clearly more of each carcass was taken away. Perhaps repeated brief visits were being made by parties of hunters on extended hunting trips, rather than by complete family groups. These hunters butchered animals before carrying away as much meat as possible. Perhaps hide-covered boats on the Wye, or if the ground was snow covered or frozen, man-hauled sledges may have compensated for a reduced number of porters.

For Unit 2b, the anatomical representation of red deer and large bovid remains is again compatible with a hunting camp, but the bones are a much smaller proportion of the identifiable material, only 27% compared to an average of 64% for Units 2c, 2d, and 3e. The most likely explanation is more intensive butchering and utilisation, because although dogs are likely to have been present, no gnawed bone is reported, and although the bones are weathered, cut and chop marks are preserved. The process of attrition has gone further in respect of roe deer, pig, horse and sheep, from which virtually no identifiable bone survives. The sheep teeth probably derive from the Beaker or later activity through explicit contamination, or through downward movement; in some cases perhaps the excavators failed to discriminate between Units 1 and 2b. Different treatment of roe deer and pig carcasses, which were more easily transported, might explain

the lack of bones. The few horse teeth are more probably relict from earlier occupation.

Given the likely carcass weight of the aurochs, large red deer and horses, the kill sites must have been very near, probably on the floor of the dry valley in front of the cave. The topography is well adapted for the purpose, since the valley is here constrained to a width of about 430 m between the cliff in which the cave is situated and those of Little Doward on the further side. King Arthur's Cave overlooks the point where the valley steepens towards the head of the gully leading down between the 20-30 m high cliffs overlooking the Wye, with which the dry valley ends, thus forming a natural trap. Hunters concealed among birch woodland on the 14° slopes of the valley sides, would have been well placed to ambush driven game or animals moving up or down, while the cliff-top above the cave commands a wider view of the valley of the Wye leading down to Monmouth. At this intermediate scale King Arthur's Cave is sited on the ridge between the grazing grounds of the Herefordshire plain, and the broad valley around Monmouth at the confluence of Wye, Monnow and Trothy. The narrowness of the Symonds Yat gorge makes the Ganarew col (Figure 1) more attractive as a route than the main river valley (Helme 1989, p. 126).

On a larger scale, King Arthur's Cave in the Late Devensian can be seen as one of a network of known sites spaced at intervals of 30-50 km (David 1991, Figure 14.1), the nearest being Arrow Court, Kington in Herefordshire and Gwernvale, Crickhowell in Powys. The annual or periodic round of movement may have taken in Gough's Cave at Cheddar, or sites in the Gower, respectively 65 km and 100 km distant. The acquisition of fresh Chalk flint suggests that the periodic range of the hunters visiting King Arthur's Cave included sites on or close to the Cretaceous outcrop in North Wiltshire, about 60 km away, although Cretaceous chert and other flint will have been available in the gravels of the emerged Severn and the Bristol Avon. The large backed point of Tjongerian style from the Chew Valley south of Bristol (ApSimon 1957; Campbell 1977) and the recently found curved-backed piece from just west of the Wye at Llanishen, Gwent (Walters 1989, Figure 2, 2) may be markers for numerous but otherwise unknown intermediate bivouac and kill sites. Also missing from the map are sites in the Severn valley and the emerged Bristol Channel plain, and by the late-glacial shoreline another 30-100 km west of the Gower. The changing pattern of activity seen in Unit 2c might be explained by deteriorating climate around 12,000 yr BP leading to the human group involved shifting its annual territory, leaving King Arthur's Cave beyond the range of normal hunting trips, and finally beyond the range of even extended trips.

When these hunters came to King Arthur's Cave, they came to a location where shelter and fuel were predictably available. Although, on the evidence of the animal bone, the local subsistence resources were not large in scale, so that the strategy could be called logistical, the prediction that there was a good probability of encountering and ambushing game close to the site lifts the strategy from random to structured foraging.

The picture for the mid-Devensian (Inter-pleniglacial) is less clear. From the artefactual traces it can be suggested that mobile groups of hunters targeting equally mobile herds of herbivores in an open landscape were involved, and that 'residential'

functions were extremely simple, perhaps no more than temporary hearths and bivouacs, with longer term camps perhaps restricted to the emerged Bristol Channel plain. Finally we can as yet say little about the shadowy Middle Palaeolithic visitors to the cave, who almost certainly must have been Neanderthals. While their visit may have been only a single 'event', they came prepared for scarcity of good raw materials, carrying with them not only their kit of tools and hunting equipment, but also quite large nodules of good Chalk flint from which to make necessary replacements, perhaps discarding only flaking debris.

CONCLUSIONS

The first aim of this paper has been to present and interpret the evidence from the investigations at King Arthur's Cave in such a way as to make the results accessible in terms of up-to-date archaeological thinking. That this should be possible, despite the vicissitudes suffered by the site, the finds and the records, and despite the shortcomings of the various excavations, is largely because of the conscientious and pertinacious recording and thinking-through of problems by the late Dr Herbert Taylor.

Fortunately it can be said that the Mesolithic occupation, which is probably assignable to the Late Boreal or the early Atlantic, and the two successive Later Upper Palaeolithic phases, probably assignable respectively to the end of the Bölling phase, and to the equivalent of the Dryas II and early Allerød phases of the Late-Glacial Interstadial complex, can be satisfactorily placed in stratigraphic, chronological and environmental contexts. The placing of the brief Early Upper Palaeolithic Lincombian phase in the mid-Devensian (Inter-Pleniglacial) seems probable, though doubts must remain, while the context for an Aurignacian phase is a matter of hypothesis. For the first time it is possible to make sense of Symonds' deep sounding, and to confirm that his Cave Earth no. 2 contained traces of Middle Palaeolithic occupation. The Beaker, Romano-British and post-medieval materials remain difficult to interpret because they lack secure contexts.

One important caveat which must be entered is that use of the pooled Later Upper Palaeolithic lithic assemblage from King Arthur's Cave in analytical study of the British 'Creswellian', and its comparison with coeval lithic assemblages on the continent (Burdukiewicz 1986; Bosselin and Djindjian 1988), can hardly be sustained in view of the evidence of two phases which as well as being stratigraphically distinct, may also reflect the broad regional evolution of 'shouldered point' and 'backed point' complexes. Unfortunately, the two assemblages are really too small and fragmentary to be used individually in statistical comparisons, though their distinction remains an important piece of evidence in the wider scene, and their functional interpretation is of great interest.

The second aim is that the paper may serve as a springboard for further multi-disciplinary study of the site and its surroundings. The remaining deposits on the Platform are a precious resource which should be safeguarded for the future, but fortunately the 1920's mode of excavation with a stepped face means that further examination and sampling are possible without going beyond the limits of that

excavation. Clearance of spoil from the floor of the Second Chamber is needed to determine if remains of the Unit 5 speleothem, and underlying Unit 6 are present. This also offers potential for uranium series dating of the Middle Palaeolithic remains. The potential of the site for study of formation processes, including soil micro-morphology, of microfauna and perhaps of aspects of its archaeology, including the extant collections, remains high. To this end it is important that a coherent plan for its study and conservation be formulated.

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APPENDIX A. THE SPELAEOLOGICAL SOCIETY ARCHIVE

This comprises, in addition to the surviving museum collections, plans and section drawings and sketches, photographs, find catalogues, correspondence and notes. Pre-1940 material (no. 1-6 are extant post-1940 drawings by AMA) includes:

Plans and section drawings:
7. Plan of cave at 1:60, by F.B.A. Welch, 1925 (Hewer 1926, Figure 1); probably a compass survey, details seriously inaccurate.
8. Plan of cave at 1:60, by T.F. Hewer or H. Taylor (?), (1926?); traced from 7, with details of excavation outside derived from 10. The 'Hearth' is shown in a different location because the inaccuracy of 7 made it impossible to locate it in its true position. Possibly for a report on the 1926 excavation.
9. Plan at 1:120, undated; showing the cave and excavations outside, including the 'rift'; based on 7, with detail added from 11, but inaccuracies derived from 7 reduce its usefulness.
10. Plan at 1:48, by T.F. Hewer, 1926, showing excavations in September 1926 in the cave mouth and on the Platform, based on 7. Shows the location of the 1926 trial trench, the limit between disturbed and undisturbed deposits in the cave mouth, and the southern edge of 'Pit 3', but discrepancies in measurements suggest that much of its detail is sketched.
11. Plan at 1:32, by H. Taylor, dated 31-10-29; showing details of the excavations on the Platform outside the cave, dimensioned, but not precisely located with respect to fixed points. Correspondence of details on it with the 1985 plan and the 1952 cutting has allowed a 'best fit' to be adopted, probably accurate within about 0.25 m.

There are also a number of sketch sections, some with dimensions marked. Two diagrammatic longitudinal sections drawn by Taylor show the stratification in the Alley. The first drawn in 1935-6, possibly for exhibition at the inaugural meeting of the British Spelaeological Association in 1935 (Doc. 30a), gives: 1 Stalagmitic debris and 2 Lower Cave Earth (Red Clay And Silt). The second, drawn about August 1937 to accompany faunal material which Taylor intended to send to Wilfrid Jackson for identification (HT ms 3 and separate drawing), gives the stratification noted in the detailed discussion above.

Photographs: very few, copied from old glass 3-in. slides.

Catalogues: Manuscript Catalogue, Loose-leaf foolscap catalogues of finds initially typed by Taylor, c. June 1928, from Ms. by Hewer, 1927, and continued in Ms. by Taylor up to 1929, adding finds made in 1952, but not in 1959. These form the basis of the post-war slip catalogue (UBSS Catalogue). A supplementary catalogue detailing the faunal material retained or discarded was prepared by Tratman in 1976 (EKT Catalogue). This contains serious inaccuracies.

The log-book of the 1925-9 excavations is lost, probably burnt in 1940. Taylor thought that he had it or that he had taken it to Hibberd's Farm at Burrington in 1939-40 with other material, but no trace of it has been found. To judge from other UBSS log books, it probably contained sketch plans and sections and measurements taken in relation to a datum line across the cave mouth that would have allowed a fair degree of localisation of each day's finds. All records of the 1952 and 1959 work are preserved, including plans, section drawings, notes, photographs, excavation logs, correspondence (from 1939), and miscellaneous notes and sketches by Taylor. Computer databases covering artifacts and some of the fauna have been prepared and are available for consultation.

Taylor Manuscripts (HT Ms.):
1. Notes for Lecture: Recent work of the UBSS (c. 1928-9)
2. Ts. list, Faunal Material sent for identification, August 1937
3. Ms. draft of the same
4. Ms. list of Material sent to Hereford Museum, 13. 5. 39

5. Ms. list of faunal identifications by Breuil and Jackson, 1937.
6. Ms. faunal lists compiled March 1952. These were used in compiling the lists at the end of the 1955-7 text:
   a) first version,
   b) amended copy, p.5, notes: "Man (skull frags) T" as an afterthought to the faunal list for Yellow Rubble; un-numbered page at end: "Human remains", verso has "sketch section of trial trench on platform, Sept 1-9 1926", shows vertical face at inner end, height of deposit 5'4", bottom of trench = top of red loam, "red clay in centre of Platform 3 yards in front of cave mouth was over 2ft thick, Apr 20 1929, in fact 3'0". (A sketch by Taylor dated January 1958 (Doc. 1) shows an isolated block only of Units 3c and 3d left in the cave mouth).

APPENDIX B. SURVEY OF KING ARTHUR'S CAVE

The new survey of the cave presented in the plan (Figures 2 and 3) is related to a local notional metric grid whose conventional south-north axis is parallel to a line from the 'old white cross' (OWC) painted on the rear wall of the cave (station 1 of the 1925 survey), to survey point β, a steel bar sunk in the ground on the platform. The imaginary origin (site datum) of this grid is located south-west of OWC so that all coordinate measurements for the site are positive. The incidence of the grid is shown on the plans and sections. For convenience, all descriptions assume a conventional north, corresponding to the top of the plan.

The datum used in preparing the sections is given the value 5.00 m above site datum (asd), and the resulting coordinates of OWC are 15.00 m E, 3.00 m N, 5.63 m asd. Coordinates for β are 15.00 m E, 24.13 m N. A benchmark cut on the cliff face at 12.50 m E, 16.30 m N, has the value 5.22 m asd. Survey point α has the value 15.00 m E, 17.38 m N; it is not defined on the ground but can be resurrected by measuring diagonally 4.96 m from the gap in the top of the figure 9 painted on the cliff face at approx 17.3 m E, 13 m N, and 3.75 m diagonally from the bottom nail of the old notice board on the cliff face at approx 10.3 m E, 16.8 m N. The survey is at 1:60, the field drawing has levelled points marked on it, not all reproduced in the report, values for which are in the record.

APPENDIX C. HUMAN BONE FROM UNIT 2C (LOST)

W.2.1.13-34: All from just below the middle of the depth, 13-28 from 76-83 cm deep, 29-35 from 68-76 cm deep, found on 23 September 1929 (UBSS catalogue entries by H.Taylor):
13-24, cranial vault fragments, 13, frontal (?) with ridge for falx cerebri, 14, interparietal section, 15, frontal, 20-22, burnt; 25, articular condyle of mandible; 26, l. malar; 27, skull fragment; 28, r. orbit margin, 2 fitting pieces; 29, cranial vault, 2 fitting fragments, colour and preservation identical to 13-28; 30-4, cranial vault fragments, 34 doubtfully human. All the fragments were abnormally dark, but all bones in this area were dark due to humic staining. There is no comment in the manuscript catalogue for these or other entries on the same date to suggest gross disturbance of the layer, except for penetration by tree roots which seems to have caused humic infiltration. Taylor's 1952 faunal list (HT ms 6b, 'Human Remains'), notes them without suggesting disturbance. They were the only human bones from the site which could have been Upper Palaeolithic or Mesolithic.

APPENDIX D. DESCRIPTIONS OF ARTEFACTS ILLUSTRATED

Key to entries: description, lh = left-hand, rh = right-hand; length (L), breadth (B) and thickness (T) in mm; UBSS catalogue no. (000), x = incorrectly re-catalogued, * = extant, u = unscathed, cast = plaster cast extant; (Herefd 0000) = Hereford Mus. catalogue no.; bibliographic reference (1926 = Hewer 1926, 1928 = Taylor 1928, Campbell = Campbell 1977); (XX00) = Campbell's typological code.

Figure 9, 1-15: 1-3, 10-12, 15 from Unit 1; 7-9, 13 from transitional zone 1/2b; 4, 5, 14 from zone 1/3e.1; 6 was a 1925 find by Mr Grigg, provenance unknown.

1. Half of broad leaf-shaped arrowhead, impact fracture on tip, snapped across middle with rounded fracture, shouldered effect due to later fractures, (413*) (1928 Figure 3,3).
2. Barbed-and-tanged arrowhead, convex edges, tip and 1 barb broken, (409*) (1928 Figure 3,1).
3. Barbed-and-tanged arrowhead with long tang, (398*) (1928 Figure 3,2).
4. Barbed-and-tanged arrowhead, (031*) (1926, Figure 4,3) (Herefd).
5. Basal part of barbed-and-tanged arrowhead, (026*) (Herefd 1289).,
6. Barbed-and-tanged arrowhead, tip broken, (917*) (Herefd 5417).
7. Finely scaled blade point, proximal end missing, (209) (1928, Figure 3,14).
8. Blade with fine scaled flaking on both edges, Neolithic or beaker knife?, (210*) (1928, Figure 3,15).
9. Bladelet with single straight backed edge, (213) (1928, Figure 3,5) (AB8).
10. Bladelet with retouch part way along either edge, (412) (1928, Figure 3,6).
11. Bulbar segment of bladelet, notch chipped in rh edge, notch in lh edge is perhaps accidental, snapping facet, B 9, (402*) (1928, Figure 3,8) (NB).
12. Blade with serrated edge (saw), (180A*) (1928, Figure 3,9) (FB1).
13. Convex end scraper on thin broad flake, low angle flaking, L 28, B 22, (206*) (1928, Figure 3,12).
14. Snapped convex scraper on flake, (028*) (Herefd 1289) (CA2).
15. Keeled waste blade, basal notch and damage on rh edge subsequent, possibly all damage, L 46, B 17, (289*) (1928, Figure 3,10).

Figure 9, 16-50: from Unit 2b, First Hearth; 20 from mixed material including humus and old spoil, 30 from discoloured rubble at the transition to Unit 2c.

16. Blade, obliquely truncated, pedunculate with 2 notches, ? damage, L 32, (159) (1928, Figure 4,3) (AA1?).
17. Bladelet, oblique blunting and possible backing of RH edge, pseudo shoulder, L 24, (227) (1928, Figure 4,4) (AA1?).
18. Distal segment of snapped blade, obliquely blunted, tip worn, basal notches are damage, B 11, (232*u) (1928, Figure 4,5) (AC2).
19. Spall, with retouch along rh edge, not a point, L 24, (175*u) (1928, Figure 4,6) (HA1).
20. Butt end of blade with cortex, possibly worked to awl point, notches more like damage, borer, (172*u) (1928, Figure 4,7) (EA2).
21. Scalene triangle microlith, (047*u) (1928, Figure 4,27) (AC22a).
22. Scalene triangle microlith, (167*u) (1928, Figure 4,25) (AC22a).
23. Bladelet, blunted along straight rh edge and curved lh edge, (253) (1928, Figure 4,31).
24. Bladelet, blunted along rh edge and partially along lh edge, broken, (254) (1928, Figure 4,13) (AB11).
25. Bladelet with single steeply backed edge and backing of one end, (174*u) (1928, Figure 4,19) (AB10).
26. Bladelet with single edge backing, (046) (1928, Figure 4,16) (AB8).
27. Bladelet with single edge backing, (045*) (1928, Figure 4,15) (AB8)

28. Long rod microlith blunted along both edges, pointed tip, (247*) (1928, Figure 4,8) (ABIIa).
29. Blade, 32, blunted along straight lh side, rh side curved, (246) (1928, Figure 4,22) (AB2).
30. Backed bladelet, 'rod', broken, partial retouch on lower rh edge, L 28, B 5, (346*) (1928, Figure 4,9) (AB).
31. Rough flint flake with retouched edges, (169) (1928, Figure 5,12).
32. Blade, both ends snapped, some retouch on rh side, B 11, (171*u) (1928, Figure 5,13) (HA1).
33. Near basal segment of bladelet with retouch along all lh edge and at base of rh edge, B 11, (054*) (1928, Figure 5,14).
34. Blade, snapped, some retouch or damage on both edges, (095) (1928, Figure 5,20) (KBIb).
35. Segment of backed blade, (125*) (1928, Figure 5,21).
36. Flake with cortex, tip inversely worked to borer or awl, (320) (1928, Figure 5,25) (EBIb).
37. Blade with cortex on lh side, trimming flake from blade core, inverse retouch (?) makes notch at base, (085) (1928, Figure 5,22) (HC1).
38. Irregular flake or blade, lh edge has very light retouch on the 'tang', edges damaged, tip obliquely blunted, worn, L 37, B 21, (236*u) (1928, Figure 5,18).
39. End scraper on bulbar end of long blade, rh face is old snapping facet ? lh face old bulbar surface ?, distal truncation ?, snapped, ochreous patina older, dead white on retouch and bulbar surface, L 47, B 10, (151*u) (1928, Figure 5,1) (CB1).
40. Slightly nosed scraper on thin broad flake, (069) (1928, Figure 5,6).
41. Convex scraper on distal snapped segment of thin flake, lh edge worked to convex scraper, rh edge steeply trimmed, L 33, B 23, (150*) (1928, Figure 5,5).
42. Thin convex scraper on flake or blade, (073) (1928, Figure 5,2) (CE1).
43. Convex end — side scraper on flake, rh edge is cortex, base snapped, L 25, B 16, (062*) (1928, Figure 5,4).
44. Convex end scraper on flake, partly snapped before patination, working steep — resharpened, L 39, (372*u) (1928, Figure 5,3) (CA2).
45. Broad cortical blade, moderately steep scaled flaking all round except for part of lh edge, knife or side scraper, plain bulbar face, L 46, (168*) (1928, Figure 5,17).
46. Median burin, 3 facets one side, 2 the other, not all burin facets, (373) (1928, Figure 5,9).
47. Median burin, (299x) (1928, Figure 5,10) (BC3?).
48. Blade core, (136) (1928, Figure 5,7).
49. Core, (234) (1928, Figure 5,8).
50. Broad blade with two retouched converging edges and rounded point, (170) (1928, Figure 5,26) (HB1).

Figure 10, 1-20: from Unit 2c, Yellow Rubble; 1-4, 6, 7, 14 and 16, from upper half, mostly in front of the east side of the cave mouth; 5, 9, 11 and 20, from lower half; 8, 10, 17 and 18, from lowest third (ie 3rd stratum of 15 cm slices, increased to 22 cm to include all down to Unit 2d; 15 from bottom of the layer resting on Unit 2d.

1. Thick keeled blade with continuous convex backing on lh edge, possible long burin facet or impact scar on rh edge, L 46 B 10 (219* + cast) (1928, Figure 6,1) (ABIa).
2. Narrow blade with slightly convex continuous backing on lh edge (312) (1928, Figure 6,11).
3. Segment of snapped blade with oblique truncation B 09 (307 cast) (1928, Figure 6,6) (AA1).
4. Backed blade, snapped, L 32 B 11 (356 cast) (1928, Figure 6,2) (AB2).
5. Tip of backed blade, B 23 (65) (1928, Figure 6,4) (AB2).
6. Short backed blade, (357) (1928, Figure 6,3) (AB2).
7. Distal segment of blade with backing on rh edge, B 11 (314* cast) (1928, Figure 6,12).
8. Tip segment of blade steeply backed on rh edge, snapped, L 29 B 10 (361* cast) (1928, Figure 6,7) (AB2).
9. Blade segment, rh edge backed, snapped, B 11 (364* + cast) (1928, Figure 6,8) (AB2).

10. Backed blade, knife, B 9 (367) (1928, Figure 6,9) (AB2).
11. Tip of a backed blade, B 10 (366) (1928, Figure 6,10).
12. Steep transverse scraper on bulbar segment of snapped blade, striking platform snapped off, heavily used, rh edge has possible use wear, white patination, L 33 B 28 (482 cast) (CC2b).
13. Distal segment of blade, snapped, terminal truncation and backing on rh edge, inverse damage on lh edge, L 28 B 20 (477 cast) (AC12).
14. Side scraper on blade or flake with steep to semi-steep retouch on edges, lh edge has discontinuous heavy use-wear, rh edge has two lengths less heavy use, basal point has scale facet and use-rounding, distal point appears unused, L 53 B 17 (355 cast) (1928, Figure 6,5).
15. Broad blade, steeply retouched to awl point (broken), retouch carries down rh edge, L 42 B 21 (197 cast) (1928, Figure 6,13) (EB2).
16. Medial segment of broad cortical blade, both ends snapped, cortex partly removed by scaling, rh edge finely retouched, B 25 (360*) (1928, Figure 6,18).
17. Large flake or blade from blade core, truncated by ? burin blow, worked to borer or piercer to judge from worn edges, L 46 B 21 (305*) (1928, Figure 6,15) (EB1).
18. Convex scraper on thin flake, retouch extends down lh edge, rh edge is cortex, L 27 B 20 (359* + cast) (1928, Figure 6,17).
19. Burin spall from implement with nibbled edge, L 39 B 4 (353 cast) (1928, Figure 6,14).
20. Prismatic blade, 1 end worked, fabricator, graver or strike-a-light, (363*) (1928, Figure 6,16).

Figure 10, 21-36: from Unit 2d, Second Hearth.

21. Obliquely blunted backed blade, broken, scar on bulbar surface is impact, not burin, B 12 (082 cast) (1928, Figure 7,5) (AC2b).
22. Blade with steep backing on lh edge, trace nibbled retouch on rh edge, base deeply notched, snapped, B11 (146*u) (1928, Figure 7,2) (AE).
23. Tip segment of bladelet with retouch on rh edge, pointed, fire crackled and fractured, B 7 (067* + cast) (1928, Figure 7,4).
24. Distal end of blade chipped obliquely to sharp point, possibly a knife, B 16 (418 cast) (1928, Figure 7,3) (AA1).
25. Shouldered blade, retouch on lh edge, distal end worked into awl, butt end obliquely snapped, L 34 B 23 (301*u) (1928, Figure 7,8).
26. Thick blade with blunting of lh edge and oblique truncation, not point, broken, B 11 (196 cast) (1928, Figure 7,13) (AC2).
27. Crested blade, keel formed by adjacent striking platforms, bulbar end snapped, distal end has retouch (damage ?) due to scraper use, possible retouch or use-wear facets on lh edge, L 42 B 15 (341*u) (1928, Figure 7,10) (JA).
28. Broad blade, convex lh edge partly backed, shallower retouch towards tip, badly damaged by burning, pressure fracture on tip may be old? (078* + cast) (1928, Figure 7,1) (AB1b).
29. Thin hinge-fractured flake struck from flake or blade, edge retouched to convex scraper, chalky cortex on opposing edge, B 21 (076*u + cast) (1928, Figure 7,7) (CA4).
30. End scraper on thick blade, bulbar end transversely snapped, calcined with shatter fractures, B 23 (148*u + cast) (1928, Figure 7,6) (CB1a).
31. Rostrate scraper on keeled secondary flake with cortex, much used, platform snapped obliquely, inverse retouch or damage on lower rh edge, L 39 B 29 (417*u) (1928, Figure 7,12) (CA5).
32. Segment of blade, some retouch on rh edge, burin facet truncated by snapped end, B 16 (303*u) (1928, Figure 7,16) (BB2).
33. Segment of blade, backing on lh edge, oblique burin facet on distal break, retouch on rh edge, B 14 (079*u) (1928, Figure 7,15) (BC3).
34. Thick blade fragment, burnt and fire crackled, 2 burin facets on rh edge, (60x (=425?)*u) (1928, Figure 7,11).

35. Large blade (2 conjoined pieces), awl, polished by use, L 75 B 21 (145*u, 340*u) (1928, Figure 7,9) (EB1).
36. Median burin on broad cortical flake, secondary spalls struck obliquely from primary oblique facet, end in deep notch, L 41 B 25 (339* + cast) (1928, Figure 7,14) (BD1).

Figure 10, 37-40: from Unit 3c, Mammoth Layer; 40 was found in a vertical position sticking into the subjacent Red Loam (Unit 3d).

37. Fragment of backed blade, retouch almost vertical, B 7 (437) (1928, Figure 8,2) (AB2).
38. Piece of secondary flake with flat flaking on back — done on core, edges much damaged, cortex present, B 28 (434) (1928, Figure 9,1).
39. Blade with backed convex edge, burin blow at base, L 33 B 12 (436) (1928, Figure 8,3) (AB1/BC1).
40. Long blade worked to convex scraper at distal end, lh edge nibbled, retouch at base, L 81 B 13 (336* proximal half) (1928, Figure 8,4) (CB1?).

Other tools from the Mammoth Layer, not figured and not now recognizably extant, comprised: a retouched fragment (337) (1928, 79); a flake with a little secondary retouch on either side of obtuse angled point (433); a "microlithic point" (438); the butt end of a backed blade knife on a stout keeled flake, fire crackled (447). Descriptions of the few waste pieces, also lost, are technologically uninformative.

Figure 11, 1-25: from Unit 3e, Grey cave earth in the Passage; 1, 3-7 from 0-15 cm; 2, 8-22 from 15-45 cm, 18-21 specifically from Hearth 3, 22 from close to the hearth and at the same level, above the rock shelf; 23-5 from 45-90 cm, the deeper part of the unit in the entrance to the Passage, immediately below the dark zone thought to correspond to the Hearth 3.

1. Piece of polished bone rod, oval cross section, both ends broken, lower end shows oblique bevel cut short by break, L 60 B 9 T 5.5 (11) (1928, Figure 2, 17, Plate IIIa, 8) (IICB1).
2. Piece of polished bone rod, split longitudinally, (32) (Taylor 1928, Figure 2,18, Plate IIIa,7) (IIA).
3. Short steep convex scraper on thick flake, (25) (1926, 223) (CA2).
4. Borer or piercer on flake, cortex, (27) (1926, Figure 4,06) (EA2).
5. Small end scraper on blade, (23*) (1928, Figure 2,15) (HC1).
6. Broad blade, possibly shouldered, broken, (39) (1928, Figure 2,16) (B).
7. Blade with some blunting of rh edge near base, (22) (HC1a).
8. Basal segment of blade, retouch gives slight shouldering of lh edge, B 15 (04*) (1926, Figure 3,13) (HD1a).
9. Blade with backing on one edge, retouch or use on other, B 24 (05) (1926, Figure 3,6) (HD1a).
10. Backed blade with oblique truncation, retouch continuous, wear on truncation, L 36 B 12 (08*u) (1926, Figure 3,2) (Campbell, Figure 134,6) AC2).
11. Awl or borer on broad blade, tip broken, edges damaged, B 20 (09*) (1926, Figure 3,5) (Campbell, Figure 134,11) EB6).
12. Bladelet with partial backing of rh edge or perhaps spall, L 22 B 6 (11*) (1926, Figure 3,14) (HC1c).
13. Bladelet with backing of lh edge, L 23 B 5 (12*) (1926, Figure 3,11) (Ha1).
14. Bladelet continuously backed on convex rh edge, pointed, B 7 (13*) (1926, Figure 3,10) (AC2b).
15. Bladelet, distal end, lh edge backed, L 22 B 7 (344*) (1926, Figure 3,12) (HD1).
16. Basal segment of blade, bulb removed, snapped, backed on lh side, damage on right, butt smoothed, L 15 B 11 (06*u) (1926, Figure 3, 4) (HD1a).
17. Proximal segment of ridged blade of fine grained rock, lh edge steeply retouched, basal notch damage, B 16 (38*u) (1928, Figure 2,14).

18. Blade with rh edge retouch, tip snapped, knife? L 27 B 12 (02*u) (1926, Figure 3,8) (Campbell, Figure 134,1) (AB2).
19. Burin on oblique truncation or burin spall from large burin on blade, L 30 B 10 (10*u) (1926, Figure 3,3) (Campbell, Figure 134, 3) (BA1/NA).
20. Blunted blade, snapped, B 11 (03) (1926, Figure 3, 9) (HD1a).
21. Backed blade segment, L 20 B 12 (14*) (1926, Figure 3, 7) (HD1).
22. Proximal end of snapped broad blade with inverse scaled flaking on bulbar surface at base, edges damaged, basal part of bulbar surface has polished look, hinge snapped at middle, B 22 (01*u) (1926, Figure 3,1) (Campbell, Figure 97,2) (HE1).
23. Distal segment of snapped bladelet, partial backing on lh edge, B 10 (185*) (1928, Figure 2,12) (HD1).
24. Backed bladelet, both ends snapped, backing vertical, L 23 B 10 (184*) (1928, Figure 2,11) (Campbell, Figure 134,2) (HA1).
25. Irregular blade from blade core, cortex remains on lower (bulbar ?) end, ? prior facets on lh edge, rh curved edge backed or damaged, L 32 B 20 (183) (1928, Figure 2,13) (AB1b).

Figure 11, 26-30: from Unit 0, old spoil dumps outside the cave.

26. Thick pointed piece on flake, vertical retouch along lh edge, steep along rh edge, distal end pointed, edges near point much worn, basal edge formed by longitudinal facet, worn, L 60 B 22 (395*) (1928, Figure 2,1).
27. Long blade with cortex, burin on curved unprepared end, (90) (1928, Figure 2,10) (BC1).
28. Median burin on distal end of snapped blade, 2 lateral facets at proximal end, B 20 (393*u) (1928, Figure 2,9) (BE2).
29. Blade with oblique truncation, discontinuous with inverse backing on rh edge, B 11 (281*) (1928, Figure 2,5) (AC5b).
30. Small convex scraper on thin flake, shallow low angle scale flaking, L 19 B 23 (513*).

Figure 12. Probably from Unit 6, Lower Cave Earth in Second Chamber (Gloucester Museum, A.3159, see Appendix F below).

1. Distal part of broad flake of dark grey flint corticated to 1 mm depth, proximal half removed by recent fracture, lh edge is thin cortex or ancient break encrusted with sediment, ends in partly incipient hinge fracture; dorsal surface shows bed of previous flake directed orthogonally from rh edge, with a broad wave formed by an incipient hinge fracture; rh side of dorsum of core was thinned by a centripedal flake directed along the same axis, proximal part of surface shows bed of thinning flake directed along main axis of flake and another directed from lh edge, area of damage at proximal lh corner and character of recent break suggest possible thermal alteration, no retouch or wear, L 60 B 72 T 7 (943).
2. Broad flake, deeply white corticated flint, fairly fresh thin cortex without chatter marks on lh edge; dorsal surface has negative of previous flake struck from same platform along an axis differing by about 20°, dorsum of core was thinned by invasive flake struck orthogonally from the rh side, 5 facets on heel, 3 lh probably struck from dorsum of core before previous flake struck, 2 rh may be re-preparing platform, broad deep bulb, flake has feathered out on surface of core, area of damage at proximal rh corner and slight pitting of dorsum and cortex suggest thermal alteration, slight damage to distal and rh edge, no retouch or wear, L 45 B 52 (944).

APPENDIX E. FAUNAL REMAINS IN OTHER MUSEUMS
(numbers of specimens in parentheses)

Bristol, City Museum

Geology section (not registered): rhinoceros (1)

British Museum (Natural History)

BM(NH)PAL.DEPT 42040-61. Presented in July 1870, by the Hon. James H. Howard, Commissioner of Woods and Forests, per W.A. Symonds.
Hyaena (1), mammoth (2), horse (15), woolly rhinoceros (20), aurochs (1), cervid (1), reindeer (antler) (6).

The collection includes mainly teeth; the portions of shed antlers 'with markings of gnawing by a large carnivore', and the bones noted as having been all 'more or less gnawed'. The larger of the two portions of lower molars of mammoth (42040), fitted a portion of mammoth molar found by Dr Taylor in 1959 in the old spoil in the Main Chamber.

A marginal note in the register, evidently copied from a covering letter says: "These remains were dug up in an old Cave or mine working in a Wood belonging to the Crown called Great Doward Wood . . . on the Herefordshire side of the River Wye. They were about six feet below the surface of the Floor of the Cave, which is locally known as 'King Arthur's Cave' ".

The depth of about 1.8 m quoted for these finds and the adherent traces of reddish cave earth makes it highly likely that they come from the continuation of the Red Loam, Unit 3d, in the Main Chamber.

— M 12937-9. Presented by P.B. Symonds per M.A. Hinton in 1925, comprise three premolars (RP^4, LP^2, LP^2) of woolly rhinoceros.

Symonds (1938) says milk teeth, but Andrew Current notes (in lit, 9-4-85): 'they are rather small and could easily be confused with the deciduous dentition'. They are to be equated with 'the perfect set of mammoth (sic) milk dentition sent to the B.M.N.H. by Hewer via Hinton in 1925' (archive; the register entry is in the handwriting of Martin Hinton). They were probably found by P.B. Symonds in his initial trench across the cave mouth. Currant's observation that 'they match the older material in every detail of preservation and in the nature of the adherent matrix' suggests that they may also derive from the Red Loam.

Cheltenham Art Gallery and Museum

CHLGM 1904: 1:1; 1:4. 'Cornford Collection', material donated by Rev. Cornford.

— 1978: 268-9, 271-8, 280, 301.1. Also Cornford Collection 'but not previously accessioned', Bear (1), hyaena (7), horse (1), rhinoceros? (8), red deer (1), ox? (3).

Gloucester, City Museum

GLRCM 24,884-25,063, 25,086-25,148. Presented by the Rev. W.S. Symonds.
Brown bear (1), cave bear (2), hyaena (2), lion (4), otter (2), wolf (2), mammoth (12), rhinoceros (50), giant deer (5), cervid (2), reindeer (14), bison (7), aurochs (6), bovid (23).

Only a small proportion of this material has provenances, 9 specimens to 'cave earth', 5 to 'upper stratum', 13 to 'Lower Cave Earth'. The latter includes giant deer (*Megaloceros giganteus*), reindeer, bison and aurochs. Prof. R.J.G. Savage confirmed (1958) the identification of the giant deer specimen: 25,120: right maxilla with P^3, P^4, M^{1-3}.

Hereford, City Museum and Art Gallery

HFDMG 7111/1-30, 33-9. Probably excavated by Rev. W.S. Symonds in 1871.
Bear (1), hyaena (4), wolf (1), fox (2), mammoth (7), horse (7), rhinoceros (33), red deer, roe deer (2), reindeer (1), aurochs (7), celtic shorthorn (1), sheep/goat (1), badger (4).

This material was originally at Wyastone Leys house, Ganarew, formerly the residence of the Bannerman family (Helme 1989, 126-7). It came to Monmouth Museum in 1955 from Brigadier Waller of the Leys; it was transferred to Hereford in 1959, but a small loan collection remains in Monmouth (Ref. 2/1/4-13). There was no documentation and none of the items were marked, so the possibility of conflation with remains from Bannerman's cave no. 2, which yielded hyaena, mammoth and rhinoceros (Guise 1873), is not excluded.

APPENDIX F. ARTEFACTS IN OTHER MUSEUMS
(Conventions as in appendix D)

Bristol, City Museum

BRSMG 38/1969. Given by G.H.T. Goymour, no context, total 1: (921) flint waste blade fragment.

— 7371. Paine Collection, from Great Doward Cave (Merlin's Cave) and King Arthur's Cave. Most of this material is evidently from an excavation in Merlin's Cave in 1912 (cf Hewer 1925, p. 125 note 3), but a waste blade and fragment with greyish white patina and a white patinated waste blade (S-S-9) could be from King Arthur's.

Gloucester, City Museum

GLRCM A.3155. 1871, supposed Upper Cave Earth, total 8: (922) backed blade with opposed oblique truncation (AC23), (Campbell, Figure 134, 7; Burdukiewicz Plate vii, 16), penknife point; (923) blade with oblique truncation, (AA1) (Garrod Figure 12, 1); (924) retouched blade; (925) backed blade with oblique opposed blunting?; (926) 4 waste blades; all flint with pale grey patina.

— A.3156. 1871, Upper Cave Earth (Symonds 1871, 435), total 2: (927) broad blade core, (Garrod Figure 12, 3); (928) core ?, 'rough disc' (Garrod, p. 78); both black Carboniferous chert.

— A.3157. 1871, as A.3155, total 4: (929-32) waste, 2 chert, 2 flint pale grey patination.

— A.3158. 1871, no provenance, total 11: (933) blade with oblique truncation and lateral burin facet on truncation (BA1) (Garrod Figure 12, 7); (934) bladelet, snapped; (935) blade, snapped, from bipolar core, distal end smoothed by use; (936) blade segment; (937) blade with oblique truncation, (AA1) (Garrod Figure 12, 4); (938) end scraper on blade (CB1) (Garrod Figure 12, 6); (969), snapped blade with backing on lh edge (AB2), (Campbell, Figure 134, 5; Burdukiewicz, Plate vii, 17), not seen; all flint with smooth white patination. Thacker (1912), followed by Garrod, attributed these to the Lower Cave Earth, Unit 6, because of their patina. However, similar patina occurs on material from Units 2 and 3. — A.3159. 1871, no provenance (probably Lower Cave Earth, Unit 6), total 5: (943-5) 2 flakes and 3 chips, all have deep creamy white patina (See Figure 12 and Discussion above).

— A.3160. 'superficial soil with pottery', 1871?: (947) hone, fine- grained sandstone, L 130.

— A.3161. 1871, 'from layer above the Palaeolithic', total 2: (948) end scraper on short blade, (CA2), (Garrod Figure 12, 2); (949), convex scraper on end of short blade, (CA2), (Garrod Figure 12, 5).

25,064-70, 25,073-84. 1871?, supposed King Arthur's Cave, or 'the Bear's Den', total 18: (950-67) pebbles, of a variety of siltstones, mudstones, sandstones, shale, quartz, Carboniferous limestone and chert, 3 are tufa coated, 4 have flaked or rubbed facets with one flaked surface, 1 may have been used as a hammerstone, 1 as a scraper.

Hereford, City Museum and Art Gallery

(Note: Grigg = Anon. 1948)

HFDMG 1289. 1925, from UBSS excavations, given by P.B. Symonds, total 4: (14) (Figure 11, 21); (26) (Figure 8, 5); (28) (Figure 8, 14); (344) (Figure 11, 15).

— 1289. 1871, P.B.Symonds from W.S.Symonds plus Ballard Collection, total 34: (901) obliquely blunted shouldered point, broken, (AD1), (Campbell, Figure 134, 8; Burdukiewicz, Plate vii, 14); (902) thick blade segment with battered edges, strike-a-light?; (903-6) blade segments and miscellaneous waste.

— 3997. 1871, given by P.B.Symonds, probably from King Arthur's Cave, total 16: (907) blade segments, 1 retouched, uniform dull white patina.

— 5415. 1925-32, found by Mr Grigg, no context information, total 9: (908) end scraper and angle graver on thick ridged blade (BA4/CA2) (Grigg 7; Campbell, Figure 134, 12; Burdukiewicz, Plate vii, 12); (913) scraper or knife on keeled oval flake, retouch continues along rh edge (Grigg 3); (916) blade with slightly oblique truncation, (AA1) (Grigg 5; Campbell, Figure 134, 4; Burdukiewicz, Plate vii, 10); (912) longitudinal burin on unprepared end of broad blade, (BC1), (Grigg, 6; Campbell, Figure 134, 10; Burdukiewicz, Plate vii, 6); (909-11) (Grigg 2, found 1925, Grigg 1, found 1932, Grigg 8, 9), (915), 4 waste.

— 5417. Grigg, found 6-9-25: (917) barbed-and-tanged arrowhead, tip broken, (Figure 8, 6; Grigg 4).

— 7111. 'Excavations c. 1870', as faunal material, total 2: 31 (901) steeply worked point - awl (EB2), (Campbell, Figure 134, 9; Burdukiewicz, Plate vii, 9); 32 (903) 1 waste.

Cardiff, National Museum of Wales

Z.36.52-55. source unknown: (968) burin and 5 flakes.

APPENDIX G. BIBLIOGRAPHY OF ITEMS NOT CITED IN TEXT

This omits passing references to the cave and minor references in caving publications which have no significant archaeological, geomorphological, or historical content. The proceedings of the Woolhope Naturalists were published contemporaneously in the Hereford Times.

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