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CHARTERHOUSE WARREN FARM SWALLET, MENDIP, SOMERSET

EXPLORATION, GEOMORPHOLOGY, TAPHONOMY AND ARCHAEOLOGY

by

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ABSTRACT

Excavations at Charterhouse Warren Farm Swallet first took place between 1972 and 1976 and led to the discovery of a deposit containing several horizons of archaeological activity. These terminated with Iron Age and Roman inhumations and the earliest deposits, though not yet absolutely dated, are probably Neolithic or Early Bronze Age. The failure to discover a cave system after excavating the deposit to a depth of twenty metres led to the abandonment of the venture, but renewed interest in 1984 resulted in the eventual discovery of the cave system late in that year.

The discovery of the caves and of the bone deposits in the Upper Caves is described, and detailed geomorphological and archaeological surveys are discussed and analysed. The former describes the formation processes involved, including a discussion of the origin and development of the cave, and an analysis of the sequence of sediment fills. The origin and development of the cave are discussed in terms of the structural control which is related to several near vertical fractures in some places and bedding planes in other areas of the cave. The sediment sequence is shown to be complicated and is divided into an initial siliceous allochthonous fill, followed by various autochthonous fills. The description of the sediment analysis also includes a detailed discussion of the emplacement of the bone-bearing fill. This is followed by a detailed analysis of the artefacts and bones. The artefacts, though not very numerous, are an important and, in some respects, unique assemblage with a Beaker, several 'sponge finger' stones and a flint assemblage including a fine dagger being among the prominent finds. The bone report considers the two deposits separately, and concludes that the many similarities imply a broadly similar date. An important feature of the bone assemblage is the human bones: those with knife cuts from Horizon 2 of the Entrance Shaft, and infant human bones from Horizon 4 of the Entrance Shaft. These are likely to be ritual deposits and are related to the placement of the artefacts. Bones of aurochs are present in Horizon 1 of the Entrance Shaft and are the latest known survival of this species in Britain. Human and aurochs bones are also present in the cave, and the distribution of these and other bones is analysed in detail. The non-human bones, in contrast to the human bones, appear to relate to domestic activities, with husbandry centred on cattle and pig implying an open woodland environment.

The report is concluded with a general discussion of the importance of the archaeology of the site in a regional context. The chronology of the Entrance Shaft sequence is considered and comparisons with Beaker and Neolithic sites indicate that the basal part of the sequence is Neolithic, the Beaker horizon possibly representing a desanctification of the Neolithic burial deposits in the Beaker period. The environment of the locality is also considered: the region may have been more extensively wooded than at present, and the swallet provided a damp micro-habitat for shade/damp-loving species of mollusca, amphibia, etc.

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INTRODUCTION

Charterhouse Warren Farm Swallet is situated on the west side of a small dry valley feeding into Velvet Bottom (FIGS. 1 and 2). In its original state, it resembled a small dry stone walling quarry, with rock walls on the east and west sides and a floor of recent (very smelly) detritus. The hawthorn tree on the north side of the depression provides a good reference point in comparing the original state of the depression (FIG. 3) with its present appearance (FIG. 4). Originally, interest in the site stemmed from the fact that the depression was known to take water in times of flood, with the major floods of 1968 an important instance of this, implying an underlying cave system.

Although the locality was known for its archaeological interest (e.g. Roman workings in Velvet Bottom), initial interest in the site was for cave exploration only. It was only after the discovery of human bones that any archaeological potential was suspected, and the late Dr R. F. Everton became involved (Everton, 1974; 1975).

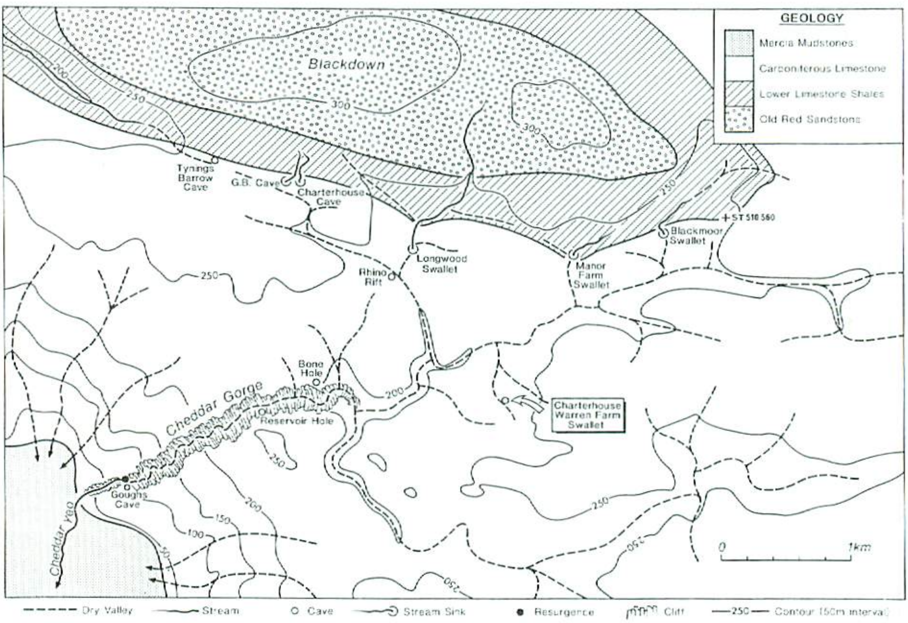

FIG. 1—LOCATION OF CHARTERHOUSE WARREN FARM SWALLET IN RELATION TO THE GEOLOGY, DRY VALLEYS AND KNOWN CAVES OF THE CENTRAL MENDIP AREA

FIG. 2—THE DRY VALLEY CONTAINING CHARTERHOUSE WARREN FARM SWALLET
Photograph: A. Philpott

FIG. 3—CHARTERHOUSE WARREN FARM SWALLET IN 1972
Photograph: A. Audsley

FIG. 4—CHARTERHOUSE WARREN FARM SWALLET IN 1986
Photograph: A. Philpott

The subsequent discoveries include the fine assemblage of artefacts (of which the most important are a nearly complete Beaker and a fine flint dagger) described below, and a large number of bones which comprise human bones, many of which bear cut-marks and other evidence of 'butchery', and non-human bones including those of aurochs (*Bos primigenius*). The last have been dated and remain the latest known survival of this species in Britain (Burleigh and Clutton-Brock, 1977; Everton and Everton, 1977; Grigson, 1981). Despite the obvious archaeological importance of the remains, and the potential for further work at the cave, no attention was given to the site by archaeologists after the first campaign ended in 1976.

Renewed interest in the site in 1984 was, again, for cave exploration. The cavers responsible for the explorations involved the archaeologists in further work when the new deposits in Bone Chamber were discovered.

Exploration of the caves is continuing, and, in the light of the geomorphological analysis, is now directed towards the phreatic passageway in Red Deer Passage and elsewhere in the Lower Cave, away from the bone deposits. The full extent of the archaeological deposits has still to be demonstrated, so it is hoped that exploration of the upper passages in Mitchell's Chamber, where much of the deposit is thought to originate, will be pursued in the future. The full potential of the assemblages has not yet been realized, and, if funding for further work is obtained, the remaining questions (particularly those relating to the dating of the assemblages) can be tackled.

This report is aimed at a diverse readership, and in order to give something of the background to both the caving and archaeological elements, some detail concerning the methods employed will be given.

Sections by A. Audsley and P. and A. Moody describe the two sets of excavations which took place, the second leading to the discovery of the cave. This is followed by a description of the cave by P. and A. Moody and a note on the various methods of survey employed (B. M. Levitan and P. L. Smart). There is a detailed analysis of the cave geomorphology and sediments by P. L. Smart, followed by sections describing the stratigraphy of the Entrance Shaft (A. Audsley and B. M. Levitan), the archaeological finds (J. S. Thomas) and the bone report (B. M. Levitan). Finally, there is a discussion of the site environment (B. M. Levitan) and the archaeological importance and context of the cave (B. M. Levitan, J. S. Thomas and C. J. Hawkes).

EXCAVATIONS 1972–1976

A. Audsley

The initial investigations at this site took place in April 1972, when a cave dig was started at the northern end of the depression. It was thought to be the ideal site for a summer season surface dig. The first digging sessions concentrated on lowering the floor at the northern end of the rift. After clearing away the recent detritus (Horizon a, FIG. 5), which contained a number of bones from sheep carcasses, a level comprising jammed boulders was obtained. A trial shaft was sunk to try to determine the extent of the rift. The first indication of what the site held in store was encountered at a depth of about three metres when a small open cavity, or side passage was encountered (FIGS. 5 and 6). This now forms the present entrance to the cave (see p. 180), but at that time it appeared as a narrow rift roofed over by flowstone cemented boulders which narrowed into impassability after about three metres. Bones discovered in its entrance were at first thought to be of recent animals (based on the experience of the sheep bones described above) but, after the discovery of a mandible, the presence of human bones

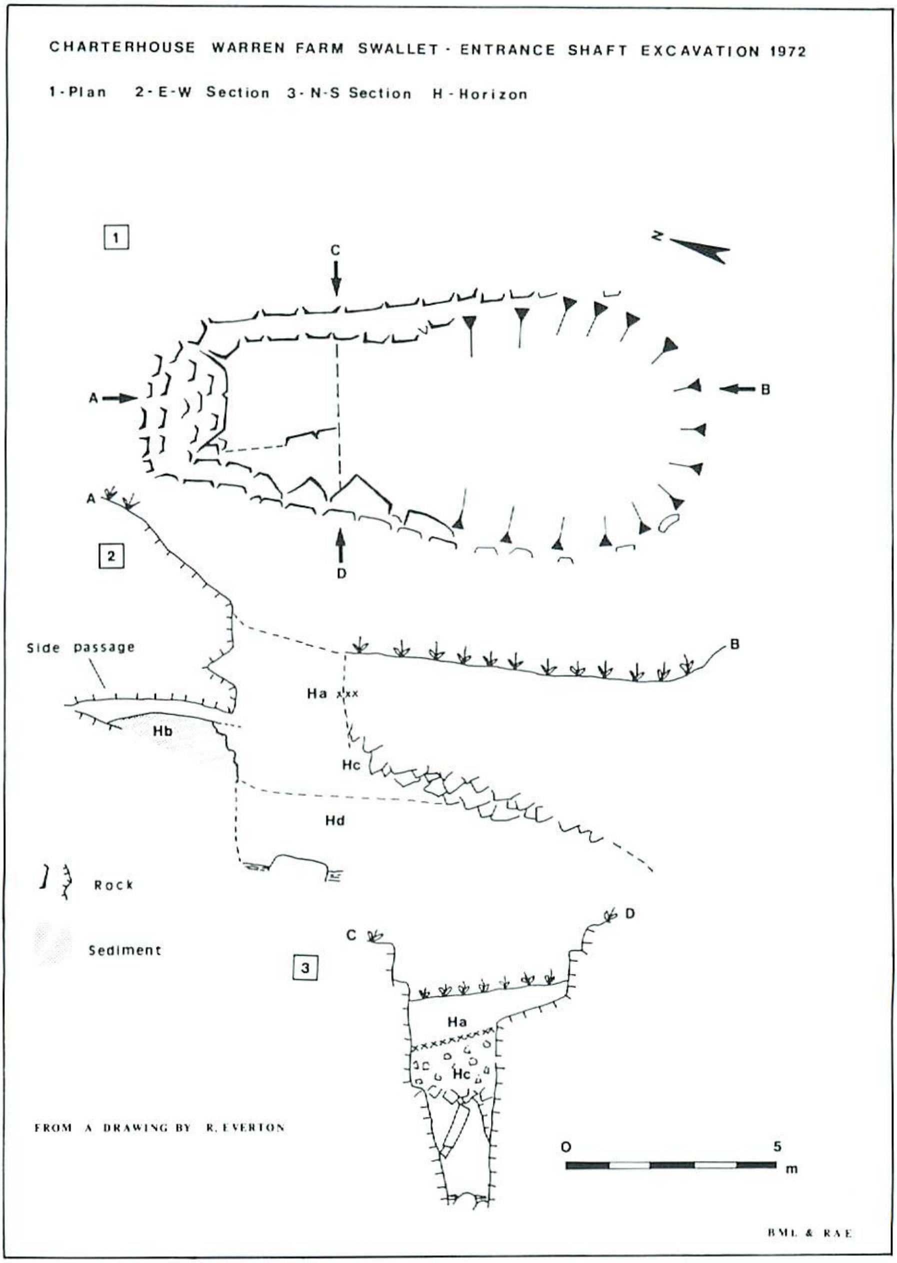

Fig. 5—Sketch plan and sections of the upper part of the Entrance Shaft excavation

was recognized. Digging was temporarily halted in order to photograph (FIG. 7) and remove the bones. These bones were, in fact, a Romano-British inhumation of first century AD date. This date was based on the presence of a sherd of Samian pottery and the typical Roman hobnails which were revealed by X-ray examination of some iron-stained stalagmite deposit. These nails had been part of the boots that the 30 year old male had been wearing on burial.

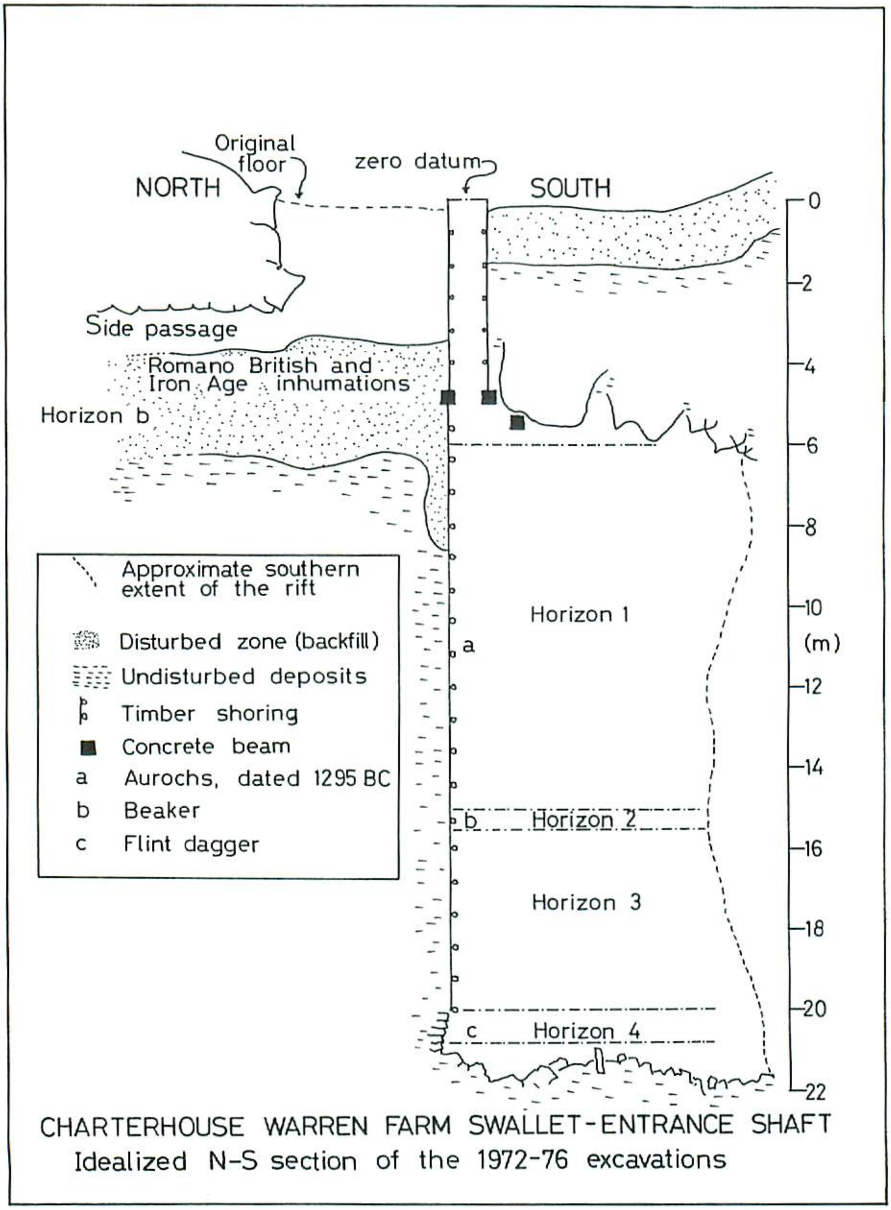

FIG. 6—IDEALIZED NORTH-SOUTH SECTION SHOWING ENTRANCE SHAFT EXCAVATIONS OF 1972-1976

FIG. 7—THE SIDE PASSAGE AT AN EARLY STAGE OF EXCAVATION, 1972
Photograph: A. Audsley

Subsequent phases of the dig consisted of lowering the threshold of the side passage and sinking pits in the area between the side shaft and the present timbered shaft (i.e. the area of the open pit shown in FIGS. 5 and 6). During these excavations several more inhumations and scattered human bones were recovered, indicating at least 28 individuals (Everton, 1974). These upper layers (FIG. 5: Horizon d) also contained a number of non-human bones and a quantity of pottery, none of which were plotted or recorded. The eventual depth reached at the northern end of the depression during this phase of the digging did not exceed about three metres below the level of the side passage floor (FIG. 5). Digging ceased due to need to stabilize the steeply overhanging, unshored southern face of the dig. This had become quite dangerous, with large boulders dropping into the dig without warning.

The base of the excavation at the northern end of the rift was covered with a layer of polythene as a future reference level, and then a layer of boulders for protection. The southern face was then collapsed, thus burying the entrance to the side passage and the initial excavation. This process of collapse and stabilization was repeated several times, working in a southerly direction along the rift. Eventually a large, jammed boulder measuring

c. $2 \times 1 \times 1$ m was encountered where the rift became narrower towards the southern end. This formed an effective support for the material above and to the south of it. Once this boulder had been stabilized with a reinforced concrete beam cast beneath, it was possible to excavate below in comparative safety. Localized depths of over twelve metres were reached, using a variety of shoring materials. Further excavation, however, would have been dangerous without proper shoring, so it was decided to construct a shored shaft the width of the rift. Thus, in October 1972, digging was halted in order to prepare the site for the installation of the shoring. Details of the engineering, and the techniques of excavation are given by Audsley (1974a; 1974b). Once the concrete beams had been cast and the shaft had been installed, all digging was concentrated to the south of the shoring line. The shoring was made up of temporary concrete grouting, backed up by substantial timbering. Spoil was removed from the rift in galvanized dustbins hauled by a 'Crab' winch. The idealized north-south sketch section (FIG. 6) illustrates the extent of the initial work, and the relationship of the passage and disturbed (i.e. backfilled) deposits. The zero datum for all depths is the angle-iron at the centre of the doors that close off the top of the shaft (FIG. 4). This point is 234.7 m AOD.

The overall impression of the archaeological material in the Entrance Shaft was of continuous scattered and mixed material between the two very distinct layers of Horizon 2 and Horizon 4 (FIGS. 6 and 8). The fill consisted of coarse angular limestone boulders throughout, the interstices of which were either clean washed or partially filled by sediment. Most of the archaeological material was associated with the 'clay'-filled zones. This 'clay' is possibly the same silty clay and silty loam as the sample from the side passage analysed by Smart (p. 194 and TABLE II) and will be referred to below as 'clay layers'.

Excavation of the Entrance Shaft proceeded slowly and steadily and, in January 1974, bones of aurochs were uncovered at a depth of eleven metres. A pelvis and lumbar vertebrae were in articulation, lying along the axis of the rift in the locality of the rock butress (FIG. 8). Associated with these is the aurochs horncore which has been radiocarbon dated (p. 200) and described by Everton (1975). Below this, finds were scattered and sparse, but not entirely absent. In May 1975 Horizon 2 was encountered (FIGS. 8 and 9). This took the form of a continuous layer of bones in a matrix of glutinous 'clay layer'. During the excavation of this horizon, on April 20th 1975 (the author's birthday!), a fragment of what at first seemed to be human cranium was found lying on a ledge on the western wall of the rift, close to the shoring. Everything within the rift at this level was covered in the glutinous 'clay', diggers included, so it was only with some difficulty that the fragment could be cleaned enough to reveal the characteristic patterning of a Beaker. Thereafter, other pieces of the Beaker were recovered from a small area of fill close to the wall in the excavated portion of the rift. Some sherds were found behind the line of the shoring, and it is likely that the missing portion of the Beaker still lies behind the shoring, the risk of collapse having been too great to search for further fragments there.

Below Horizon 2, archaeological material was again sparse and scattered, notable exceptions being the concentration of bovid material and some coarse black pottery found at a depth of nineteen metres (FIG. 8). Finally, in July 1976, at a depth of about twenty metres, a group of human infant bones was recovered, together with the assemblage of shale, bone, and flint objects (p. 207). This was Horizon 4, and represents the last archaeological material removed from the shaft as digging ceased on 22nd August 1976 at a depth of c. 21 m.

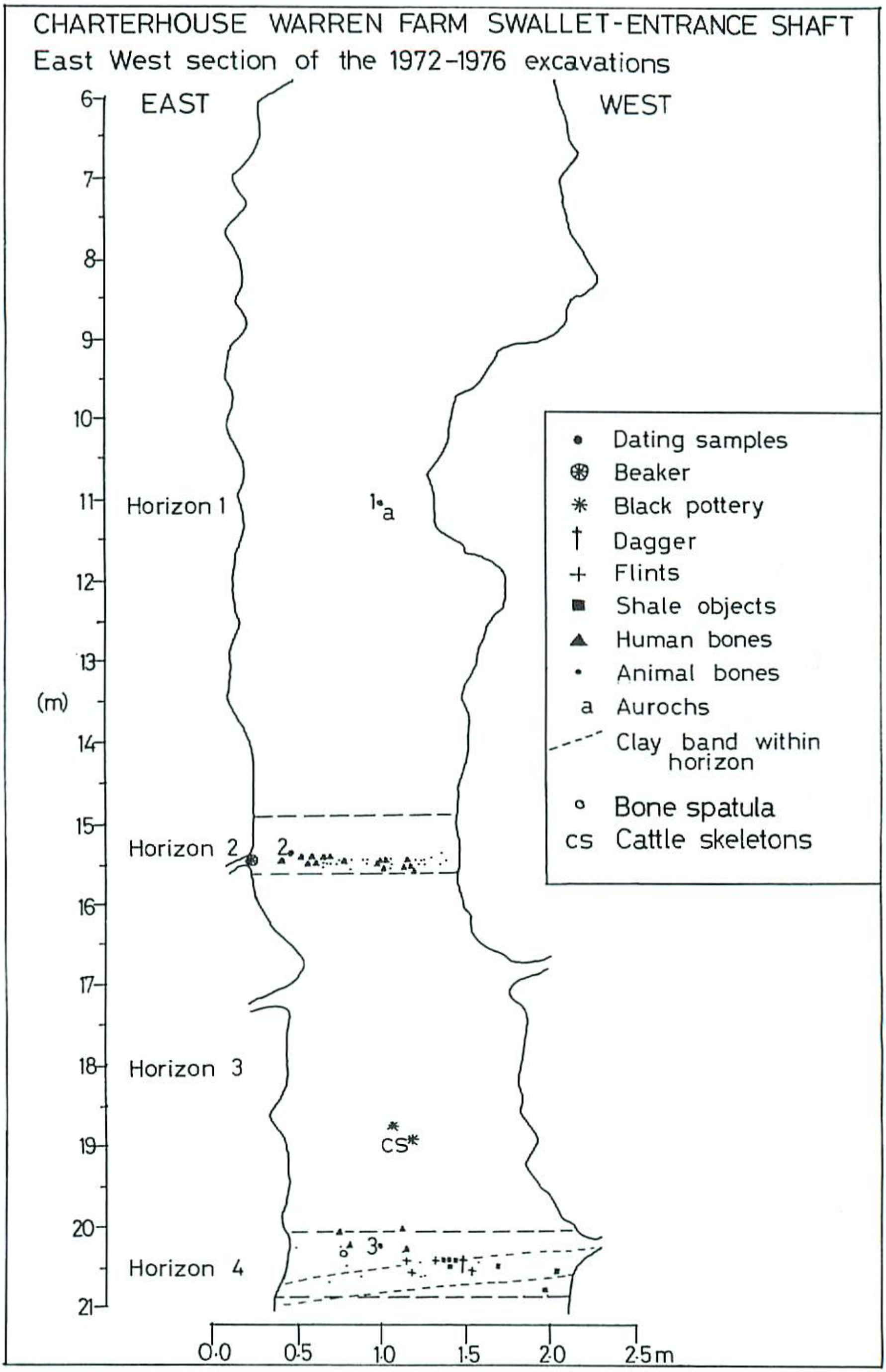

FIG. 8—EAST-WEST SECTION OF 1972-76 ENTRANCE SHAFT EXCAVATIONS

Thereafter, the pit to the north of the shored shaft (which had been backfilled) was re-excavated, and the side passage regained. Aggressive probing at the end of this passage resulted in a large pile of gravel and more passage which terminated in a decorated 'chamberlet'. No significant work occurred after 1976, and the excavations were abandoned in 1978.

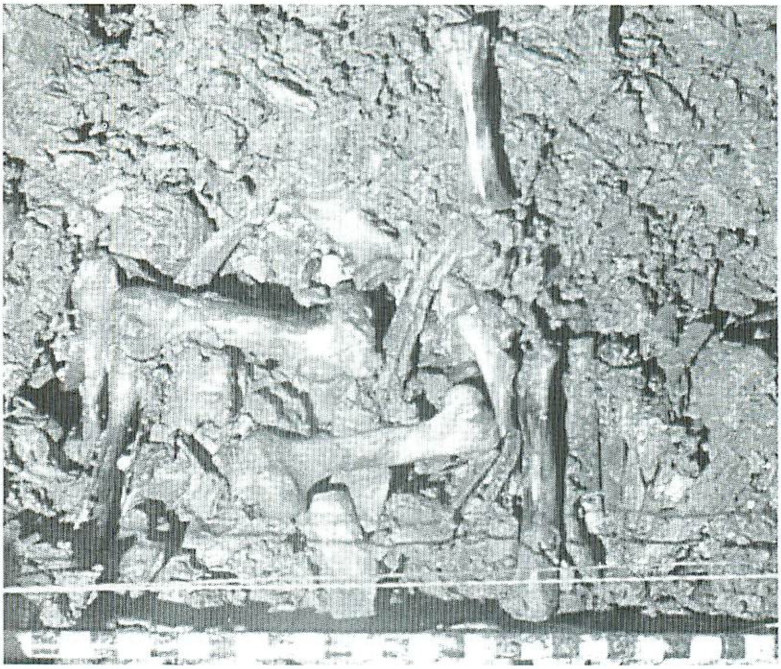

FIG. 9—PART OF THE BONE LAYER IN HORIZON 2, SEEN FROM ABOVE. NORTH IS TO THE LEFT. A PAIR OF CATTLE UPPER LIMBS ARE IN ARTICULATION (HUMERUS; RADIUS; ULNA) AND DOMINATE THE PICTURE. ALSO VISIBLE (PARTLY UNDER THE WIRE) IS A TIBIA. THE BONE ON THE EASTERN EDGE OF THE PICTURE IS A METACARPAL. OTHER BONES—ALL CATTLE—ARE ALSO VISIBLE. THE SCALE IS IN INCHES
Photograph: A. Audsley

EXCAVATIONS 1983–1986

P. and A. Moody

Interest in the site for its caving potential was rekindled late in 1983 after a chance meeting between John and Jenny Cornwell, who had taken part in the previous work, and the authors. The side passage that had received only superficial attention during the earlier work (see FIG. 5) had potential importance, the large dimensions and fluting of the rift being more reminiscent of Jingling Pot, Yorkshire than any of the Mendip caves. On a second visit the entrance to it was found after removing a metre of rocky debris. At that time the passage was accessible for about eight metres: a four metre stoop led to a tight two metre drop and a squeeze past a curtain

(Curtain Squeeze) into a blind pocket. The rift at roof level at the end point was very narrow and any view onward was concealed by concretions.

It was assumed that by digging the floor the rift would be found to widen with the way on continuing along the line of the approach passage. To facilitate the work the passage above the tight drop was first dug back to provide wider access for disposal of spoil. Two metres below Curtain Squeeze a bedrock floor was uncovered, and it was evident that the rift ahead did not widen out more than a few centimetres.

The use of explosives in clearing the passage at this point had high-lighted a cold draught which could be detected coming out from a calcited wall of rocks and stones at the back of the pit. The draught had been sufficiently strong to clear away the fumes from the explosives within a few minutes of the charge being fired. It was decided to reverse the direction of the dig and try to find the source of the draught.

Cutting back beneath the floor of Curtain Squeeze revealed a way down, but a spur of rock divided the choked shaft, and explosives had to be used at every visit to break this up and free the boulders from their calcite cement. A typical digging trip in spring 1984 involved clearing the few large blocks broken off by the previous trip's explosive finale. The rocks were placed individually in a wire cradle and hauled up using a rope and pulley. More sophisticated techniques were impossible because the dimensions of the squeese at the top of the pitch limited the size of boulders that could be removed. Once this task had been performed, paint cans were filled with smaller debris, taking care to keep to a minimum the amount dropping down into the choke in case the draught was blocked off. The cans were hauled out and passed up the entrance passage where they were emptied into a sawn-off twenty gallon container. This larger spoil container was then hauled out and the spoil tipped down the 1972–76 excavation shaft. The digging team usually comprised four people: one at the excavation face, one at the curtain to haul the cans and rocks up, one to fill the large container and a last to tip out the spoil, but on occasion the work was carried out with just two people.

By May 1984 the excavation was seven metres deep, and here a second bedrock floor was encountered. The sides of the rift narrowed dramatically from 1.5 m to barely 150 mm. As the rift was painstakingly widened, the way on began to drop steeply down again, but always closer to the old shaft. This became very evident as spoil being tipped into the old shaft could be clearly heard at the workface, and there was a real concern that the excavation might just be leading back to the old shaft. To test this hypothesis a smoke bomb was dropped into the old shaft, quickly filling it with thick white fumes. Reassuringly nothing was evident in the dig even though the draught was blowing particularly strongly at that time. For final confirmation, a charge was fired at the workface and fumes soon emerged from the dig passage. No disturbance could be seen in the fog in the old shaft.

Excavation was difficult and uncomfortable. The digger could never out-pace the spoil shifters, and was expected to keep working at all times to maintain the flow of paint cans. In order to get access to the choked floor the digger had to be almost upside down, and there was always the danger that a full paint can might tip up on the way out, or even break free, releasing a potentially lethal missile weighing three or four kilograms to hurtle back down.

In July 1984 rocks were heard to fall away somewhere below and rattle down for what seemed to be several metres. After a couple more weeks, a small bedding plane was revealed to one side of which was a narrow open rift. Dropping through this letterbox squeeze (the Corkscrew), a ledge was reached, 1.5 m down (FIG. 10). Below this the rift was choked and too tight to be negotiated, but it was obviously open. A double charge was set up on the ledge below the squeeze, and great caution was exercised in reversing the squeeze. The following week the bottom of the rift was reached three metres below the Corkscrew. The narrowing at the ledge had been only a local constriction and the floor area was now quite spacious. Ideally a person now had to be stationed at the Corkscrew to manoeuvre the cans between the two sections of the rift, but progress was fairly rapid, digging down through a mud choke. The log for the trip on 30th September recorded with some anxiety that the mud was becoming wetter and the draught less strong, but progress again speeded up down to a bridge of flowstone cemented boulders beneath which the rift was again open. In October the rocks were cleared to reveal a metre deep sphincter appearing to debouch into a major passage. A charge was fired at the constriction, and a return made with more explosives an hour later. Debris had fallen and plugged the hole, however, sealing off the draught. The effect of the fumes meant that only hurried attempts could be made to free the blockage before a retreat was necessary. At the next visit a second charge was laid and fired, and this time the hole did not block. The fumes dispersed quickly and entry into the passage below was possible. The passage ended in a wide chamber now known as Bone Chamber, littered with bones, and tantalizingly disappearing out of sight with no diminishing size (FIGS. 11 to 13). It had taken 36 digging trips over a period of 254 days to get to this point, 20 m below the starting point and 30 m below the datum point.

Exploration of the Bone Chamber and connected Mitchell's Chamber (named after David Mitchell) (FIG. 10) showed that there was no apparent way on, the furthest point being no more than 40 m from the base of the climb. Apart from unsuccessful probing of some unstable passages in the north-west end of Mitchell's Chamber, further attempts to extend the cave were postponed until the recording of the archaeological (bone) deposits had been completed.

Almost exactly a year later clearance was given to proceed. From the quantity of infill material in the Bone Chamber, another major dig was expected. At the southern and deepest (−32.9 m) end, however, working under a large jammed rock, a hole at least six metres deep was revealed after removing debris with a crowbar. The digging position was too constricted to manage the boulders encountered, so a fresh start was made further across. Again a hole was quickly uncovered, but with no wall in evidence the position was hopeless. Returning to the first site, and digging away the mud floor close to the right hand wall, a narrow crack down to the passage below was found. Further work the next day widened it sufficiently for a descent to be made, and the Lower Cave was explored (FIG. 10).

Finding the way on from these Bedding Chambers (FIG. 10) has been less successful. At first an extremely muddy bedding plane beyond Grill Chamber appeared to offer greatest promise. Despite several delays caused by sumping of this area, by January 1986 digging had forced a passage 30 m long into a drier, higher level of bedding planes. Unfortunately the way on then subdivides and the draught is lost in a series of threatening boulder chokes positioned along the strike. Near the deepest parts of the Bedding Chambers the top passages are blocked by flowstone while the lower ones are almost completely filled with mud. After two years excavation there is still no site that seems to hold hope for any quick or easy breakthrough into further extensions. The geomorphological analysis indicates that the phreatic formations of Red

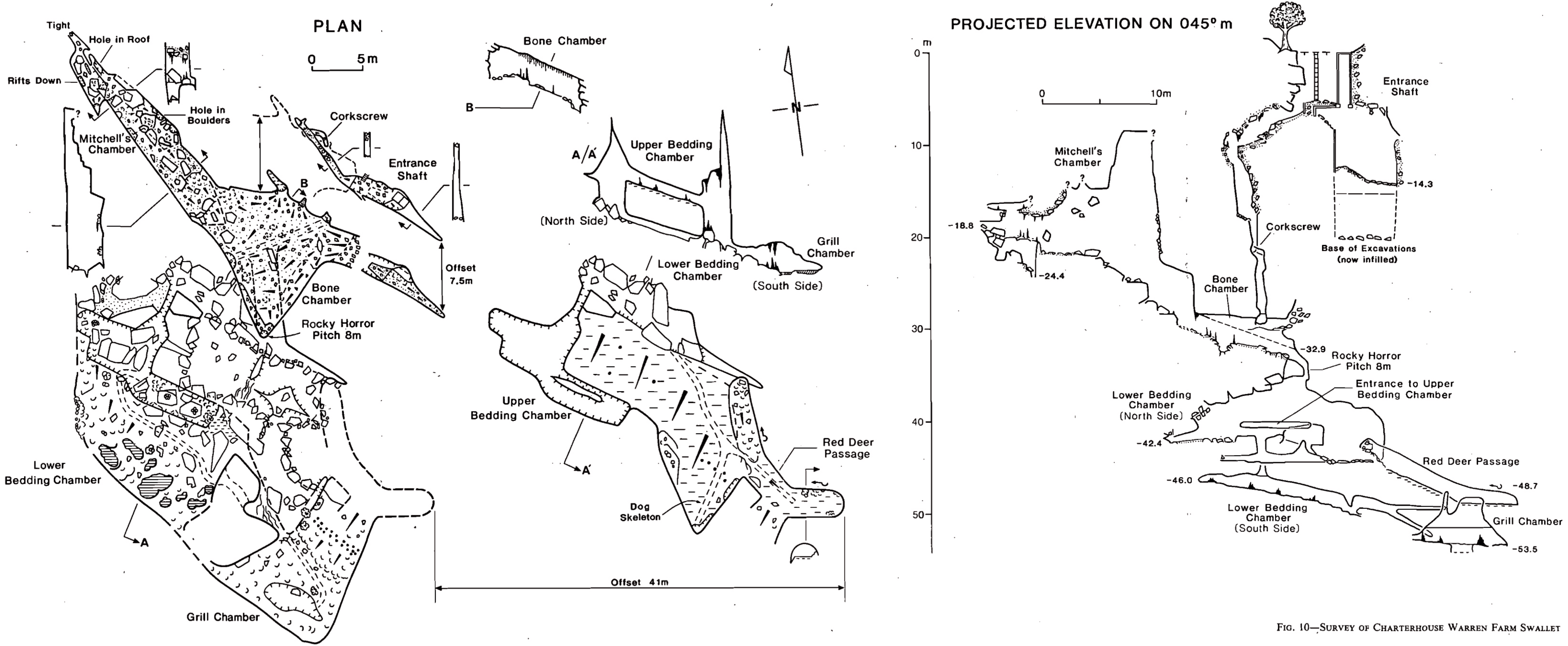

Fig. 10—Survey of Charterhouse Warren Farm Swallet

Deer Passage imply a major conduit, so present exploration activity is concentrated there.

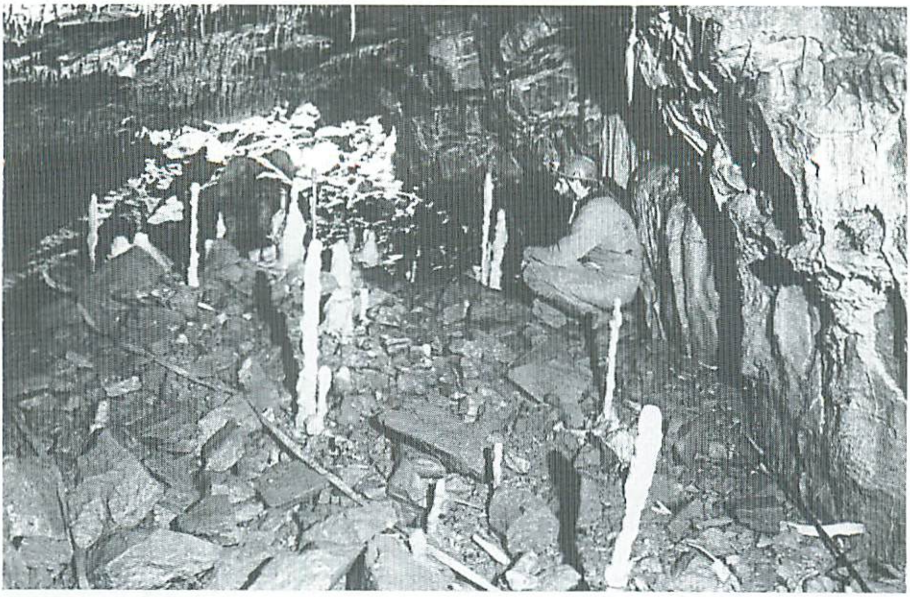

FIG. 11—VIEW OF BONE CHAMBER LOOKING NORTH-WEST FROM THE BOTTOM OF THE ENTRANCE PITCH. THE HIGHLIGHTED AREA IN THE BACKGROUND IS THE BOTTOM OF THE SLOPE INTO MITCHELL'S CHAMBER
Photograph: A. Philpott

DESCRIPTION OF THE CAVE

P. and A. Moody

Entrance to the cave is gained via a six metre fixed ladder at the north-west end of the open surface rift, next to the hawthorn tree (FIGS. 4 and 10). The horizontal passage at the foot of the ladder (the side passage mentioned by Audsley, p. 174, see FIGS. 5 and 7) has been gated and is kept locked to protect the cave. Inside the gate a short hands and knees crawl opens out into a rift that is high enough to stand up in. This, after a one metre climb down, ends at Curtain Squeeze and the shaft excavated in 1984 (FIG. 10). This shaft can be freeclimbed, but because the top section is very slippery this is safest if laddered as a ten metre pitch using a convenient natural belay high on the south-western wall. The ladder reaches the narrow two metre deep blasted section which is easily climbed. Below the Corkscrew (a letterbox-shaped squeeze) is the continuation of the shaft. The Corkscrew is much larger than in 1984 and 1985, but is still sufficiently awkward to cause tall and/or stout visitors some anguish, especially on the return. The final section of the shaft, an eight metre descent, is again an easy climb, and drops directly into the north-east end of Bone Chamber.

A taped path crosses the centre of Bone Chamber to the western wall. Bone Chamber is a wide, fairly low-roofed chamber, nearly triangular in plan (FIG. 10). In places there is enough roof height to stand, but in others a hands and knees crawl is required (FIGS. 11 and 12). The roof is lowest at the south-eastern end, especially above the ridge which runs north-west to south-east across the floor of the chamber. Bones have been cleared away from the taped path, but the rest of the chamber has bones scattered across the floor, and it is hoped that these will remain undisturbed and fully protected.

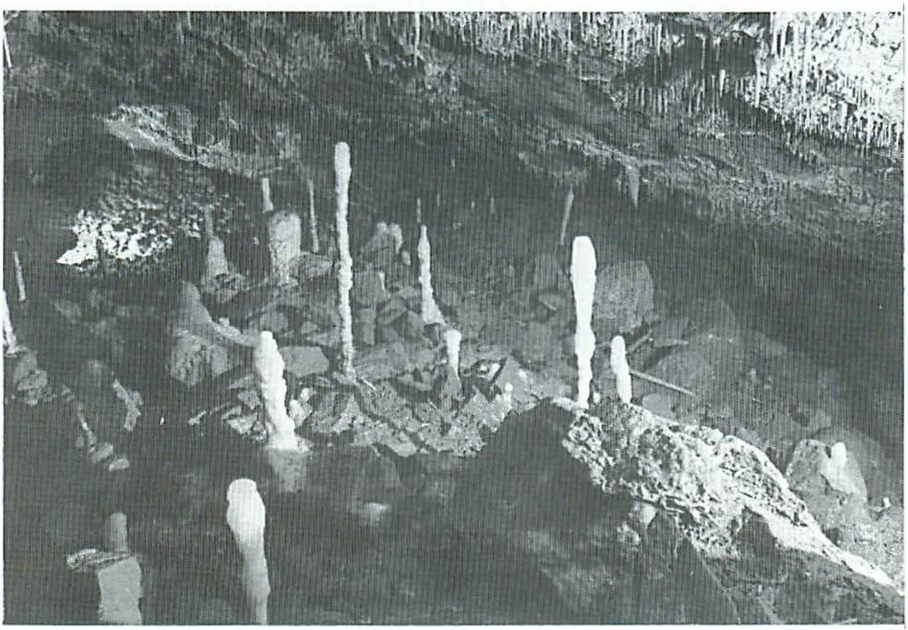

FIG. 12—VIEW OF BONE CHAMBER LOOKING EAST FROM THE BASE OF THE BOULDER PILE IN MITCHELL'S CHAMBER TOWARDS DEBRIS CONE 1 (ILLUMINATED, FAR LEFT)
Photograph: A. Philpott

The path across Bone Chamber ends at a T-junction. The taped path to the right (north-west) leads to a climb up a boulder slope into Mitchell's Chamber, fifteen metres high and four metres wide (FIG. 10). The final section of this chamber, at its north-western extremity, gained by a further one metre climb, is taped off and leads to a series of holes down between boulders.

Returning to Bone Chamber, Rocky Horror Pitch (eight metres) is reached by following the left-hand (south-eastern) path to the lowest point of the chamber. A bolt and hanger belay is available, and a short crawl gives access to the head of the pitch. The first two metres is constricted and requires considerable care on the return. Further down, the ladder hangs free and it is very easy to become unbalanced on the ascent, when re-entering the tight section. As the pitch bells out a good view is afforded of the enormous boulders that make up the walls and roof of this area. It is advisable to stand well clear of the bottom of the pitch while anyone is on the ladder.

The Lower Cave (FIG. 10) is an extensive bedding plane divided into two levels. On the northern edge these beddings are bounded by a north-west—south-east rift which terminates at both ends in unstable boulder ruckles. Rocky Horror Pitch enters mid-way along this rift and the route into the Upper Bedding Chamber is found at this point. The bedding plane is typically one metre high and about twenty metres wide. A thick mud deposit on the floor contains deposits of small bones and snail shells, and a path has been taped to preserve them. This leads diagonally down, across the bedding plane, passing a skeleton of a dog (see Appendix, pp. 235–236), to where it intercepts Red Deer Passage, a three metre high, two metre wide phreatic tube. As Smart notes below (p. 189), Red Deer Passage could hold the key to the Charterhouse Warren Farm System, and attention has been directed to the boulder choke at its upper (downstream) end. Close to the dog skeleton is a narrow slot which enters the Lower Bedding Chamber on the east side.

FIG. 13—FLOOR OF BONE CHAMBER SHOWING SOME OF THE MANY BONES STREWN ACROSS ITS SURFACE
Photograph: A. Philpott

Below Red Deer Passage the Upper and Lower Bedding Chambers amalgamate to form the pretty Grill Chamber (FIG. 10). From the southern end, a low and extremely muddy passage leads into the final extensions described above in the account of the excavations. Above Grill Chamber an alternative route back to Rocky Horror Pitch is provided by following the left-hand side of the bedding planes. Several passages off this route give entry into the Lower Bedding Chamber, a complicated maze amongst breakdown deposits.

SURVEY OF THE CAVE AND CAVE DEPOSITS

B. M. Levitan and P. L. Smart

Four methods of survey were employed: (a) a selective photographic survey (BML and PLS); (b) a levelling survey of Bone and Mitchell's Chambers (BML); (c) a compass and tape survey of the cave system (as known at present) (PLS); and (d) scale plans of the Bone Chamber (at 1:15) and Mitchell's Chamber (at 1:50) (BML).

The full archive, which comprises the survey material, a list of the bone identifications on computer, and miscellaneous correspondence is located at the Environmental Archaeology Unit, University Museum, Oxford. A duplicate of the survey material and a printout of the bone records is also held at Wells Museum, where all the finds that were removed from the site are located.

Photographic Survey

This was undertaken on two occasions. Initially a visit by cave photographer C. J. Howes, F.R.P.S., was made, and he took a number of photographs under the direction of BML, the results of which form part of the survey archive. On a later occasion BML and PLS returned with the University of Bristol Geography Department photographer A. Philpott to photograph a number of other aspects relating more specifically to the geomorphology and bone deposits of the cave.

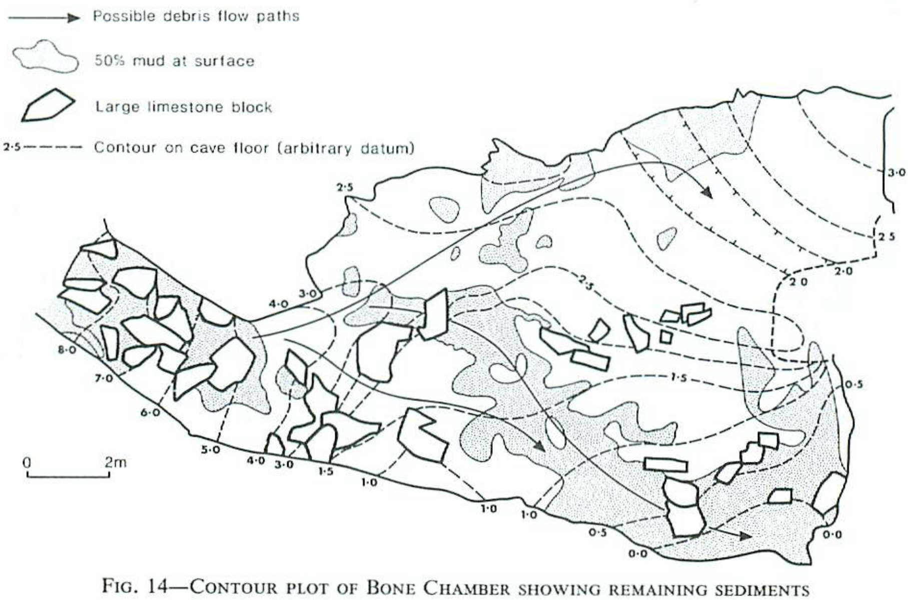

FIG. 14—CONTOUR PLOT OF BONE CHAMBER SHOWING REMAINING SEDIMENTS

Levelling Survey

The entrance was surveyed by level from the bench-mark on Charterhouse Warren Farm. Datum at cave on top frame of timbered Entrance Shaft is 234.7 m AOD. This is the zero datum point for depth measurements in the Entrance Shaft and in the Upper and Lower Caves.

Bone and Mitchell's Chambers of the cave were surveyed by means of radiation and levelling with a quickset level. Over 200 levelled points form the basis for the contour plot of the two Chambers (see FIG. 14). The locations of these points were plotted on the 1:15 and 1:50 plans (held in site archive).

Compass Survey

The cave survey was carried out by hand-held Suunto compass and clinometer read to 1°, and 30 m Fibron tape read to 0.1 m. Station positions precise to 0.1 m. Passage dimensions measured at station, and between where necessary. Misclosures on loops are given in TABLE I; not all misclosures are independent; all loops have been mutually adjusted in final survey.

TABLE I—*Misclosures in cave survey*

Loop	*Survey length* m	*Horizontal misclosure* m	*Vertical misclosure* m
Main Outer	58.6	2.6	0.2
SW Route/Lower Bedding	33.1	1.4	0.4
Upper/Lower Bedding	65.6	1.4	0.1
Dead Dog/Upper Bedding	37.7	0.8	–
Dead Dog/SW Route	80.6	2.3	–

This method is a standard caving survey procedure which produced fairly detailed information in three dimensions: plan and elevation and cross-sections (FIG. 10). The elevation reveals the relationship between the 1972–1976 excavation, much of which is now backfilled (p. 181), the present Entrance Passage, and the cave. The locations of the Beaker and dagger horizons lie some way above the level of the cave floor. The plan (FIG. 10) illustrates the relationship of the depression and the cave by means of an offset since the cave lies partly directly beneath.

Bone Chamber lies 30 m below the ground surface, and the floor of the Upper Cave rises from a deepest point of −32.9 m in Bone Chamber to −18.8 m in Mitchell's Chamber. The Bone Chamber is characterized by a triangular shape and generally low roof. Mitchell's Chamber is parallel sided and relatively narrow. It comprises a steep boulder pile and the roof rises into the high Main Aven nearly fifteen metres above the cave floor.

Plan of Bone and Mitchell's Chambers

The location of every visible bone larger than 1 cm (and including a few smaller bones) was plotted; it was assigned a number and was then identified and recorded. The location of stones and boulders, 'muddy' sediments and stalagmites and flowstone were also plotted. The resultant plans are a detailed record of the deposits in Bone and Mitchell's Chambers in their *in situ* locations.

The Bone Chamber floor was planned using one metre square planning frames, string gridded at 10 cm intervals. The frames were laid flat on the floor, so no allowance for the angle of dip has been made. The plan, at a scale of 1:15, thus gives the impression that the east-west width of the chamber is greater than a true horizontal width. The north-south distortion is not very great as in this case the dip is slight (c. 4°) and in one direction.

The steep slope and large boulder field of Mitchell's Chamber floor precluded planning using the same method, so a detailed levelling survey was undertaken, with the sides of the chamber and important features on the floor being plotted at a scale of 1:50. The rest of the detail was filled in employing measurements taken from the plotted points, using a hand tape. The plan of Mitchell's Chamber, therefore, is less accurate than the Bone Chamber plan. Since it is a truly horizontal projection and the Bone Chamber plan is not, there is distortion in the overlap between the Mitchell's Chamber plan and the Bone Chamber plan.

There follows an interim analysis of the results. This has highlighted several problems which remain to be solved, but has allowed us to formulate a possible explanation for the emplacement of the deposits within the cave. A great deal of further analysis will be necessary to answer the principal questions concerning the provenance and nature of the deposit. The accounts of the geomorphological survey analysis (PLS) and faunal survey analysis (BML) are thus, necessarily, preliminary.

GEOMORPHOLOGY AND SEDIMENTS

P. L. Smart

This account relates primarily to the Upper Cave (above and including the Bone Chamber) because the detailed work has not yet been completed in the more recent discoveries below Bone Chamber (the Lower Cave). It is divided into three sections, the origin and development of the cave and its controls, the sediment sequence present, and a detailed discussion of the mode of emplacement of the main bone-bearing deposit.

Origin and Development of the Cave

The Entrance Shaft, Entrance Rifts and Mitchell's Chamber show strong structural control by several near vertical sub-parallel fractures trending $155 \pm 10°$ (Figs. 10 and 15). These do not show vertical displacement when exposed in Mitchell's Chamber or the Entrance Shaft, but are vertically continuous, cutting over fifteen metres through several beds in the limestone. They are parallel to the fault marked in the British Geological Survey one inch to the mile sheet 280 near Charterhouse Warren Farm, and to the major Stock Hill Fault to the east. A prominent but less vertically continuous conjugate joint set trending 025° and $110 \pm 10°$ is associated with the major fractures (Fig. 15). These joints are well exposed in the roof of Mitchell's Chamber, where their close spacing has given rise to considerable breakdown. Together these joint sets indicate regional compression in a north/south direction, with possible strike-slip movement on the major fractures.

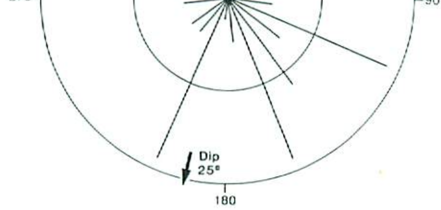

Fig. 15—Rose diagram showing frequency of joint directions (upper cave only)

In Bone Chamber and the Lower Cave, structural control is dominated by bedding planes. The regional dip measured at several points in the cave varies between 24 to 28° south with a strike of $100 \pm 10°$. This change in control between the upper and lower parts of the cave may relate to the closer spacing of bedding planes below Mitchell's Chamber (0.4 m in Bone Chamber compared with three to four metres separation in Mitchell's Chamber), and to the presence of thin shale partings. The limestone within the cave is a pure light grey biomicrite with crinoid and shell fragments, while at the top of the Entrance Shaft a dark grey to black micrite typical of the upper parts of Black Rock Limestone is present.

The wall of Mitchell's Chamber shows extensive phreatic pocketing, particularly well seen on the western wall, where it extends from floor level to a height of at least eight metres. At the north-west end of this chamber, poorly defined phreatic scallops 30 to 50 cm long indicate flow into the cave from the north-west. In Bone Chamber, collapse has modified the original solutional surface, but in the Lower Cave the morphology is again predominantly phreatic in both Upper and Lower Bedding Chambers and Red Deer Passage. Strong scalloping in the last indicates flow into the cave from the east towards the rifts below Bone Chamber. The function of the Entrance Shaft at this time is unclear, but it probably formed the outlet from the initial phreatic cave system towards the fossil resurgences in the walls of the present day Cheddar Gorge. The cave therefore functioned as a major strike integrator, lifting water from Red Deer Passage into Mitchell's Chamber/ Entrance Shaft rift. At that time the regional water table was above 227 m AOD.

The initial phreatic route involved a substantial lift and required the development of a considerable hydrostatic head. It was eventually captured by the development of the Upper and Lower Bedding Chambers, the down-dip outlet from which is now blocked by sediments. This phreatic capture is particularly clear in the case of the northward diversion of Red Deer Passage along the strike into Upper Bedding Chamber. In Mitchell's Chamber the change from a high to a low level outlet caused extensive collapse, with many of the blocks showing phreatic surface features formed by continued underwater dissolution.

Active vadose stream activity appears to have been short-lived in the exposed parts of Mitchell's and Bone Chambers, with limited vadose modification of the original phreatic morphology. In the Lower Cave, vadose erosion was of greater importance, with extensive trenching in the rifts below Mitchell's Chamber, the water discharging through Lower Bedding Chamber. The major water source was again to the north-west, with no indication of vadose inflow either from the abandoned Entrance Shaft route or Red Deer Passage. Subsequently the formative stream was captured upstream of the known cave, and only autogenic percolation entered the system until the surface dry valley intersected the existing Entrance Shaft. Vadose modification of this, the Entrance Rifts, and the floor of Bone Chamber then occurred, the water again discharging down-dip via the Lower Bedding Chamber.

Cave Sediments

Three types of sediment infill have been recognized in the cave, and will be examined in turn below.

TABLE II—*Comparison of 2 to 10 mm size particles separated by wet sieving and hand picking, and matrix colour and texture for selected sediment samples*

Sample No.	*Site*	*Matrix colour*	*Matrix texture*	*2–10 mm % wt.*	*No. of particles*	*Percentage composition of 2–10 mm size fraction*							
						Black patinated shale	*Chert*	*Bone*	*Black limest.*	*Grey limest.*	*Speleo-them*	*Cemented aggreg.*	*Other*
Siliceous allochthonous fill													
CWF14–85S	pocket in W wall, N end Mitchell's Chamber	2.5 YR 3/6	silty clay	25	147	55.8	33.3	0.7	0	2.1	0	0	1.4 sco 6.8 wfs
Autochthonous fill													
CWF3–85S	below broken flowst, W wall Mitchell's Chamber	2.5 YR 3/4	(cemen-ted)	90	175	21.7	6.3	0	0	8.0	10.3	53.1	0.6 osl
Calcareous autochthonous fills													
CWF12–85S	above false floor, Entr Passage	5 YR 3/4	silty loam	37	184	6.5	1.6	6.5	6.5	54.9	19.6	3.8	0
CWF10–85S	below false floor, Entr Passage	5 YR 4/4	silty clay	43	163	1.2	1.2	0	44.2	31.3	11.0	9.2	1.8 vc
CWF13–85S	floor, Bone Chamber	5 YR 3/2	silty clay loam	3	92	7.6	2.2	20.7	14.1	37.0	9.8	0	5.4 char 3.3 sco
CWF4–85S	mud clast, floor Bone Chamber	5 YR 3/3	silty clay	4*	15	40.0	0	20.0	0	40.0	0	0	1.0 osh
Other													
CWF5–85S	surface soil dry valley	5 YR 3/3	silty clay	0	-	-	-	-	-	-	-	-	-

*Abundant charcoal flakes <2 mm lost in float during wet sieving
sco—silicified crinoid ossicles; wfs—weathered feldspathic sandstone; osl—orange siltstone; vc—vein calcite; char—charcoal; osh—orange shale

Siliceous Allochthonous Fill

This single sediment unit is a distinctive dark red colour, and is characterized by siliceous material within both the silty clay matrix and the coarser size fractions. The 2 to 10 mm size fraction separated by wet sieving is dominated by two components (TABLE II: CWF14–85S); polished black-painted well-rounded shale, and angular to sub-rounded grey to white chert fragments. These were derived from a common source, as shown by one chert fragment which contained an inclusion of the black shale material. A significant number of well-rounded weathered coarse feldspathic sandstone fragments were also present in the sample, together with two silicified crinoid ossicles. The composition of the sediment clearly indicates an allochthonous origin, with the crinoids, black shale and chert derived by dissolution of the impure Black Rock Limestone. The sandstone is characteristic of the Old Red Sandstone Formation, which forms the core of the Black Down pericline. Whilst this component forms the major part of the sediments in swallet cave systems fed by sinking streams from Black Down, it is readily broken down during transport, being almost totally absent in the basal gravels at the abandoned Gough's Cave resurgence at Cheddar.

The siliceous allochthonous fill therefore indicates that the conduit feeding Charterhouse Warren Farm Swallet was fed from swallet(s) at the margins of the Old Red Sandstone, and developed in the basal Black Rock Limestone. The cave therefore constitutes an important link between known systems at the head of Velvet Bottom and Charterhouse, and the Cheddar risings.

Remnants of the siliceous allochthonous fill are widely distributed in both Mitchell's and Bone Chambers, although it has largely been removed by later erosion. At the northern end of Mitchell's Chamber these sediments overlie limestone breakdown products modified by *in situ* phreatic dissolution. These original phreatic dissolution surfaces possess a thin red iron-rich weathered patina, which contrasts markedly with the much fresher surfaces of clasts incorporated into later fills. Remnants of the siliceous fill extend upwards to a prominent sloping false floor in the roof of Mitchell's Chamber, above which there is a narrow phreatic slot (FIG. 10). The upper part of the sediment body contains considerable angular limestone breakdown, and is capped by speleothem. The walls and roof of Bone Chamber also exhibit traces of the siliceous fill, and it is clear that all this chamber and the lower eight metres of Mitchell's Chamber were completely buried by the sediment.

The siliceous allochthonous fill was emplaced under phreatic conditions, with sediment initially accumulating in the lower parts of Mitchell's and Bone Chambers in response to either a constriction in the conduit caused by breakdown in the more thinly-bedded limestones, or waning of the flow due to capture into the developing outlet via the Lower Cave. As the sediment built up to the roof at the northern end of Mitchell's Chamber, the constriction of flow cross-section increased velocities, driving sediment upslope into higher parts of the chamber, water discharging via the outlet in the roof.

Erosion of this fill must also have been an early event in development of the cave. The southern wall of Mitchell's Chamber, and parts of the roof of Bone Chamber show a complex of half tubes incised upward into the bedrock by dissolution at the sediment/bedrock interface. A sufficient pressure head must therefore have been present to drive this circulation, which eventually permitted reopening of Bone Chamber. This head may have been generated either by a falling external base-level, or by elimination of the crest of a downstream phreatic loop. The opening of the sediment choke was therefore contemporaneous with, or rapidly followed by, the onset of vadose conditions and by cementation of the upper parts of the fill by speleothem.

Autochthonous Fill

This complex composite unit was emplaced into the void left by removal of the siliceous fill. It is composed wholly of material from within the cave, including grey limestone breakdown from the walls and roof, material eroded from the earlier siliceous fill, and speleothem. In the 2 to 10 mm size fraction (TABLE II: CWF3–85S) the limestone comprises angular to very angular flakes probably formed by the impact of falling blocks, and by splintering at the point contacts between boulders. There is a complex internal stratigraphy within the unit. In the west wall of Mitchell's Chamber speleothem caps 0·5 m of limestone breccia, and is in turn overlain by further breccia 2·7 m thick which is capped by a second flowstone 30 cm thick. The internal stratigraphy of this flowstone is complex as it has formed on the highly irregular surface of limestone blocks and associated voids. The sediment sample CWF3–85S is taken from just below this flowstone, and has been extensively cemented.

Remnants of comparable sediments are also exposed on the east wall of Bone Chamber. These include multiple false floors overlying angular cemented limestone breccia, well seen in the alcove where the Entrance Rifts enter the chamber, and range from the roof to the present floor in elevation. During one phase of speleothem deposition a crystal pool was present on the floor of the cave, the remains of which are preserved 1.2 m above the present floor level.

Deposition of the autochthonous fill commenced after flow in the active conduit was accommodated in the Lower Cave. External sediment was therefore no longer supplied, and internal sedimentation became dominant. The highly fractured roof of Mitchell's Chamber provided a supply of coarse limestone blocks which incorporated fragments of the earlier siliceous fill, and were cemented by extensive speleothem deposition. Contemporary vadose stream activity in the Lower Cave caused periodic undermining and foundering of the breakdown pile, fracturing and disrupting speleothem, and when combined with climatically controlled variations in the rate of speleothem deposition, it generated a complex internal stratigraphy. Uranium series dating of a sample of the top of the 30 cm thick speleothem in Mitchell's Chamber gave a date of 60^{+14}_{-11} ka, while the base of a false floor in Bone Chamber yielded an age of 86^{+25}_{-19} ka (TABLE III). The latter date however is affected by detrital contamination, and both suffer from large uncertainties due to low uranium concentrations.

TABLE III—*Uranium series analysis for speleothem samples from Charterhouse Warren Farm Swallet*

Sample no.	*U. concentration* mg/g	$^{234}U/^{238}U$	$^{230}Th/^{234}U$	$^{230}Th/^{232}Th$	*Age* ka
CWF2–85A	0.067 ± 0.002	1.24 ± 0.04	0.43 ± 0.05	45 ± 4	60^{+14}_{-11}
CWF7–85A	0.050 ± 0.001	1.07 ± 0.03	0.069 ± 0.006	2.9 ± 0.3	7.7 ± 0.9
CWF9–85A	0.035 ± 0.001	1.19 ± 0.04	0.56 ± 0.07	13 ± 1	86^{+25}_{-19}

Errors are ± 1 standard deviation

Subsequent to the formation of these speleothem deposits, there was a substantial subsidence of the floor of both Mitchell's and Bone Chambers, leaving the autochthonous fill preserved *in situ* only on the walls. The floors of both chambers therefore are formed of the foundered remains of this fill, and indeed substantial cemented fragments of it can be found in the younger sediments at several places. Because of the high elevation of this cave relative to the Cheddar resurgence, it is unlikely that this post early Devensian disturbance could be accounted for by continuing activity of the major conduit, because the water table would be well below this elevation (Atkinson *et al.*, 1978). It was therefore most probably due to invasion of the cave by an active vadose stream from the surface dry valley. Nival (i.e. seasonally snow-covered) conditions during much of the mid-Devensian, when the climate was considerably more continental than that at present (Lowe and Walker, 1984), would give much higher frequency of surface flow in the dry valley, leading to undermining of the boulder pile through which the stream filtered.

Calcareous Allochthonous Fills

There is evidence of a minimum of three different calcareous allochthonous fills in the upper part of the cave, two of which clearly can be shown to post-date the autochthonous fill. All three fills are recognized by a reddish brown to dark reddish brown coloured matrix, and a predominance of limestone in the 2 to 10 mm size fraction. The most important of these three fills is the bone-bearing deposit which mantles the floor of the Bone Chamber. This deposit is characterized by a predominance of material less than 2 mm in size (in 500 g bulk samples), and by a significant bone fraction (TABLE II: CWF13–85S). The deposit also clearly contains secondary material eroded from the earlier autochthonous and siliceous fills. During wet sieving a substantial number of charcoal fragments were observed, and the 5.4% reported in TABLE II is an underestimate due to flotation and breakage losses during processing.

The bone-bearing allochthonous deposit also incorporates clasts from an earlier mud fill. These are typically up to 10 cm in diameter, tabular in shape, and rounded to well rounded, indicating transport from the initial site of deposition. They comprise cohesive lumps of dark reddish brown structureless silty clay, identical in texture and colour to a sample of modern surface soil in the dry valley. Material greater than 2 mm is very limited, and comprises extensively weathered grey limestone, black patinated shale derived from the siliceous fill, and occasional bone (TABLE II: CWF4–85S). The last may be incorporated into the sample from the main bone-bearing sediments by surface contamination. The mud clast fill has not been recognized *in situ* within the cave, but the increasing frequency of clasts towards Mitchell's Chamber suggests the fill may have formed in this area of the cave.

At the top of the Entrance Rift, two fill units occur, separated by a flowstone 4 cm thick. The lower unit overlies three metres of cemented limestone blocks, representative of the autochthonous fill of Mitchell's and Bone Chambers. It comprises 60 cm of muddy angular limestone gravel, 5 cm of reddish brown silty clay comparable to the mud clast fill described above, 6 cm of clean washed angular limestone gravel and 7 cm of muddy limestone gravel. Above the flowstone, the upper unit, another muddy limestone gravel, can be traced laterally to the present cave entrance. A sample of the upper unit (TABLE II: CWF12–85S) contains significant amounts of bone, and the composition of the 2 to 10 mm size fraction is generally similar to that of the bone-bearing sediments of Bone Chamber. They are therefore probably part of the same fill. The coarser nature of this upper part of the bone-bearing fill would be expected, given its surface source, while the higher proportion of speleothem is probably a local effect.

Following this correlation, the lower Entrance Rift fill may be contemporaneous with the mud clast fill recognized in Bone Chamber. Although there appear to be significant differences in the composition of the 2 to 10 mm size fraction, these may be due to the limited sample size for the latter. Sample CWF10–85S contains a high proportion of dark grey to black micritic limestone fragments as angular to sub-angular irregular platey and lath-shaped fragments with a fresh appearance. These are also present in the bone-bearing fill, but there the fragments are significantly more weathered. The converse is true in respect of the grey limestone component. In the bone-bearing fill it is fresh and highly angular, while in that from the Entrance Rift it is clearly weathered with some grains being rounded and showing surface pitting typical of dissolution in a sub-soil environment. The Lower Entrance Rift fill clearly relates to the mid-Devensian enlargement of the Entrance Shaft, with freeze-thaw activity on the black limestone bedrock giving fresh angular debris. Soil erosion was also active in the catchment of the dry valley, contributing both fines and weathered grey limestone from the sub-soil. Much of this finer material was translocated into the lower parts of the cave forming the mud clast fill, the coarser components being filtered out.

Derivation and Emplacement of the Bone-Bearing Fill

The deposition of this fill within the cave could most simply be explained by the progressive infill of the open Entrance Shaft by spalling from the walls and inwash of sediments from the dry valley (Everton, 1974). This simple explanation, however, cannot be accepted for reasons discussed in detail below.

The debris cone from the Entrance Shaft enters Bone Chamber in the south-east corner, and comprises coarse angular grey limestone upon which there is a relatively low density of bone material (Fig. 31). Only a few bones at the apex of the visible portion of the debris cone appear to be unambiguously incorporated between the clasts in the body of the fill, e.g. the aurochs (skull) at the easternmost part of Bone Chamber (Figs. 16 and 33). The limit of this debris cone (Debris Cone 1) is defined by the area of the cave floor below the 2.0 m contour (Fig. 14). To the south-west of this there is a ridge of much coarser limestone blocks derived by *in situ* breakdown of the chamber roof, the eastern part of which comprises cantilevered slabs rising to the main southerly dipping bedding plane ceiling directly above the breakdown ridge. This ridge is part of the autochthonous fill unit, and is composed of boulders which appear significantly more weathered than those in Debris Cone 1 (although this suggestion needs quantitative confirmation). This evidence suggests that material from the Entrance Shaft is restricted to the south-eastern corner of the chamber only, while bone and charcoal bearing sediment characteristic of the bone-bearing fill is very much more widely distributed. The detailed plan of Bone Chamber supports the suggestion that Debris Cone 1 is made up of a different material as there is an observable change in the size of clasts in the two deposits (Fig. 29), although this has not been confirmed by sampling.

This suggestion is confirmed by examination of the bone distributions for individual species (p. 212 ff., Figs. 31–37). Human material, for instance, is absent from the Entrance Shaft area (with the exception of a single vertebra), but widely distributed throughout the rest of the chamber (Fig. 32). These and other differences in faunal composition of the bones associated with Debris Cone 1 and the remainder of the Bone Chamber fill (Debris Cone 2) are discussed by Levitan (pp. 210–227); these verify that two separate sediment bodies are present. Bone is also abundant on the steep slope up from Bone Chamber to Mitchell's Chamber, but there is a marked decline of density upslope, with no large bones observed north of the break in slope to the floor level of Mitchell's Chamber, and only very limited presence of small bones and fragments. The clear inference is that the main bone-bearing sediment entered via unexplored passages in the roof of Mitchell's Chamber, which may connect either to the Entrance Shaft or to another opening to the surface which is now completely infilled.

Fig. 16—Aurochs skull (BC.DC1-841) at base of Entrance Shaft and top of Debris Cone 1
Photograph: C. J. Howes

Although all the bone present in the cave is disarticulated, it is surprising that free fall of some fifteen metres from the roof of Mitchell's Chamber onto the floor of irregular limestone boulders did not cause extensive breakage of, for instance, skulls, which show little evidence of percussive impact. Furthermore, it is difficult to envisage bone which entered from the Main Aven bouncing right across Bone Chamber with its very irregular and rough floor and limited ceiling clearance. Trapping between blocks would be expected to produce a much greater bone density in the proximal part of the deposit, whereas the distribution is remarkably uniform (Fig. 31). It is suggested, therefore, that the bone entered the cave together with a substantial amount of silty clay matrix material, and lesser amounts of limestone gravel. This accumulated as an asymmetric talus cone on the slope below the Main Aven (Debris Cone 2), and served both to cushion direct bone impact, and to dissipate energy by sequential rolling and bouncing of material down the relatively smooth surface of the cone. A careful inspection of the cave walls confirms the existence of this talus cone, with distinctive charcoal and bone-bearing material preserved in cracks and crannies above the present floor level (Fig. 17). Most of the walls are clean washed because of later inflows of water, but the height of the cone can be estimated by extrapolation. The maximum height of the bone-bearing fill in Bone Chamber was between 0.5 and 1.0 m above present floor level, but at the southern end of the chamber it reached the roof.

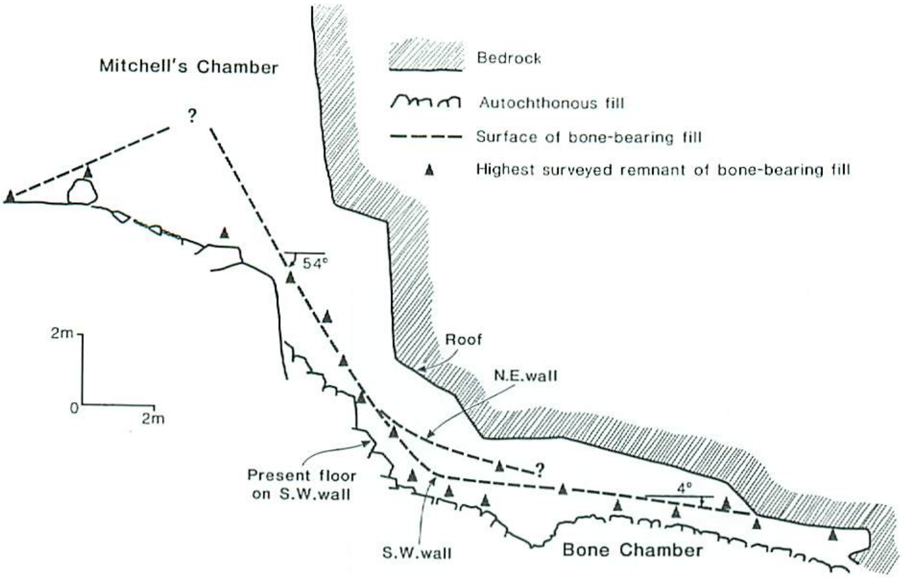

FIG. 17—RECONSTRUCTION OF DEBRIS CONE 2, BASED ON SEDIMENTS REMAINING

There was a marked break in the surface gradient of the bone-bearing fill from about 54° to less than 4° within Bone Chamber, echoing the present floor gradients. Although some movement of bone by rolling and bouncing would result on this low gradient, given the high momentum of falling bones, it is unlikely that large and irregular fragments such as the aurochs atlas close to the southern part of the eastern wall of the chamber (FIGS. 18 and 33) would be able to move right across the chamber. Emplacement of the greater portion of this deposit in Bone Chamber was, therefore, probably by debris flow. Material would accumulate on Debris Cone 2, steepening the slopes until a critical threshold was achieved. Initiation of the debris flow probably was triggered by saturation of the sediments by surface runoff entering via the Main Aven. Once mobilized, the flow would be capable of eroding material, but on the slope in Bone Chamber, deposition would occur until the lobe became immobilized or ran against the downslope wall of the chamber.

Statham (1976) described surface debris flows in the Black Mountain (South Wales), which fit well with these suggestions, the critical angle between erosion and deposition being 16° for these coarser sediments. Colcutt (1986) has discussed the conditions leading to debris flow activity in caves, and describes a considerable number of sites where they are thought to have been active. Finally, in G.B. Cave, a debris flow initiated by collapse of a fill plugging the end of the Gorge has been responsible for the intermittent transport of considerable material from the surface deep into the cave, where it was deposited on the lower gradient near the entry of Mud Passage. Debris flows with a high water content and fine matrix, such as those which probably occurred in Charterhouse Warren Farm Swallet, do not cause extensive breakage and wear of clast and bone material, in contrast to those described for Pontnewydd Cave by Currant (1984). This would also explain the transport of the mud clast fill without extensive comminution.

Examination of the distribution of fine material on the floor of Bone Chamber suggests that the debris flows may have followed well defined tracks either side of the central ridge in the chamber (FIG. 14). Some confirmation of this is provided by the distribution of bone (FIG. 31), which is largely absent from the ridge except for a narrow channel cutting across it to the south. This may explain the apparently anomalous presence of delicate, pure white stalagmites on the chamber floor (FIGS. 11 and 12) where they would be broken and contaminated by the debris flows. A uranium series date on one of these which had been accidentally broken yielded an age of 7.7 ± 0.9 ka (TABLE III), although a somewhat younger age of 2.7 ± 0.5 ka would result if a correction was applied for the presence of detrital thorium. However, given the uncertainty in this date and the exact age of the fill it is equally probable that they wholly post-date both emplacement and later excavation of the bone-bearing fill. This suggestion is supported by the observed growth of some stalagmites on bone fragments, and indicates a high rate of speleothem deposition in the cave.

FIG. 18—AUROCHS ATLAS VERTEBRA (BC.DF-2286) IN BONE CHAMBER DEBRIS FLOW DEPOSIT
Photograph: C. J. Howes

Blockage of the shaft leading to the Main Aven terminated supply of bone-bearing fill, but water continued to enter the cave via this route and also down the Entrance Shaft. Indeed the cave is reported to have absorbed a considerable surface stream from the dry valley during the great flood of 1968. These inflows have washed away much of the fine matrix material from the bone-bearing fill, reducing its net volume and eroding much of the talus cone. The remaining deposit is in effect a lag of the coarser material present in the fill. The fine bone material has been transported through the breakdown floor of Bone Chamber into the Lower Cave, where occasional larger redistributed bones are found, as well as quantities of tiny bones from small animals, and of comminuted mollusc shell which are embedded in 1–10 cm thick deposits of silty mud. The present distribution of bone reflects the greater effectiveness of this sapping process around the margins of the chamber, although this has been accentuated by removal of bones from the access path along the south-western wall. Thin flowstone is currently being deposited on the remains of the bone-bearing fill, sealing its surface and preventing further erosion (FIG. 19).

FIG. 19—FLOWSTONE DEPOSITION OVER THE BONE-BEARING FILL IN BONE CHAMBER
Photograph: C.J. Howes

TABLE IV—*Summary of development sequence, Charterhouse Warren Farm Swallet*

Phase	*Activity*
1PA	Development of major phreatic conduit; water table above 227 m AOD
1PB	Redirection of phreatic discharge from Entrance Shaft to Bedding Chambers route
1SA	Breakdown and continued dissolution in phreatic conduit
1SB	Allochthonous siliceous fill emplaced under phreatic conditions
1SC	Breakdown caps siliceous fill after sediment input declines
1VA	Water table falls steepening hydraulic hydraulic gradient, breakdown
1SP	Speleothem deposition cements top of siliceous fill and associated breakdown
2VB	Siliceous fill excavated leaving false floors and cemented sediment
2VC	Water table falls below 205 m AOD
2SA	Breakdown incorporating fragments of siliceous fill
2SB	Cementation of breakdown and speleothem deposition
3VA	Vadose stream in Lower Cave undermines autochthonous fills during continuing deposition
3V	Water table falls below 180 m AOD and streamway abandoned
3SC	Autochthonous sedimentation by breakdown and speleothem continues
4V	Vadose surface stream invades cave from surface dry valley undermining autochthonous fill
4SA	Mud clast fill in Mitchell's Chamber and Lower Entrance Rift fill introduced from surface valley
4SP	Speleothem deposition
5SA	Entrance Shaft talus cone deposited in Bone Chamber
5SB	Deposition in Entrance Shaft and Entrance Rifts continues with archaeological horizons
5SC	Contemporaneous introduction of bone-bearing fill talus cone in Mitchell's Chamber and debris flow activity in Bone Chamber
5SD	Entrance Shaft infilled, sediment input ceases
5V	Winnowing of fines from bone-bearing fill by periodic percolation stream activity, and redeposition in Lower Cave
5SP	Speleothem deposition on surface of bone-bearing fill

Discussion

The complex development sequence of Charterhouse Warren Farm Swallet is summarized in TABLE IV. Further details of the function and of the early phreatic conduit will become clear once the work in the Lower Cave is completed, but it is evident that the cave forms part of a major system directing water from Black Down to the resurgences at Cheddar. The period of autochthonous fill which followed abandonment of the cave by the active stream was protracted, and its commencement certainly lies beyond the 350 ka limit of uranium series dating, based on comparison with G.B. Cave (Atkinson *et al.*, 1978). Recently an ESR date of $1{,}060 \pm 160$ ka has been obtained from the high level resurgence cave of Great Oone's Hole at Cheddar (Smart *et al.*, in press), and this probably represents a minimum date for the autochthonous fill. The termination for this phase of activity is indicated by the two uranium series dates of 60^{+14}_{-11} and 86^{+25}_{-19} ka for speleothem at the top of the fill (TABLE III). Subsequent to this a complex series of allochthonous fills was emplaced, concluding with the bone-bearing sediments. Further uranium series dating is required to establish the chronology of this sequence, but this is hampered by the low uranium concentration of the speleothem and the presence of detritus. A single radiocarbon date has been obtained from Horizon 1 in the Entrance Shaft (see below, p. 200). The basal deposits in this shaft, however, which spill into the south-eastern corner of Bone Chamber, clearly predate this Horizon, and are also overlain by the debris-flow transported bone-bearing fill. Further dating, therefore, is necessary to establish relative age and time span of these deposits.

STRATIGRAPHY OF THE ENTRANCE SHAFT

A. Audsley and B. M. Levitan

The Entrance Shaft fill is part of the series of calcareous allochthonous fills described above. The angular and fresh-looking nature of the limestone debris appears to be the result of freeze-thaw activity, although there are no sediment samples available for analysis to prove this. Material of very similar appearance is seen in Debris Cone 1 where the Entrance Shaft fill spills out into Bone Chamber. At various levels within this fill, thin 'clay layers' were noted, this presumably being the result of active soil erosion from the dry valley, as noted above (p. 194). The section of the excavated shaft was not recorded, though the locations of many of the bones and most of the artefacts were plotted, as was the east-west profile of the Entrance Shaft (FIG. 8). The 'stratigraphy', therefore, was not recorded in detail, so the Entrance Shaft fill has been divided into two main zones comprising the upper six metres (FIG. 5) which is subdivided into four horizons, and the shored excavation shaft which descends from 6 m to 21 m below the datum point. The latter is divided into four horizons on the basis of concentrations of bone and artefacts (see FIG. 9).

The lack of precise recording and of sediment samples from the Entrance Shaft makes interpretation of the emplacement of the fill difficult. Much of the fill is presumably weathering and collapse of the limestone of the shaft, and the 'clay layers' may represent periodic inwash from the dry valley. A major problem is whether the shaft was, at times, deliberately filled by human activities. The artefacts discussed in the next section all appear to have been deliberately placed rather than thrown in or washed in. Similarly, the bones do not appear to have sustained much erosion or percussion damage, so many of these may have been deliberately placed. These problems are discussed in greater detail in a later section (p. 229 ff.).

The finds from the fill of the upper six metres were not well recorded. Field notes and drawings (FIG. 5) indicate that the upper part of the fill comprised about one metre of mixed, modern detritus, beneath which was about four to five metres of fill which contained the Romano-British and Iron Age inhumations described by Everton (1974). In order to separate this part of the excavation from the rest, the horizons in it have been labelled alphabetically (a to c). The horizons in the lower deposits have been labelled numerically (1 to 4).

Horizon 1, which occupies the upper nine metres of the shored excavation (FIGS. 6 and 8) was less well recorded than the lower horizons. The depth and location of the aurochs finds were plotted, but other finds were not recorded. It is possible that Horizon 1 should be subdivided, but there is not enough information to do so. It is regrettable that Horizon 1 was not fully recorded, particularly because, in retrospect, this horizon occupies the 'hiatus' between Bronze Age and Iron Age finds (p. 212).

The two bone/artefact horizons, Horizons 2 and 4, possibly indicate two periods when human activity resulted in deliberate emplacement of these materials on the (then) top level of the fill. Intervening periods saw the progressive infill of the Entrance Shaft with relatively little deliberate, and some accidental, emplacement of bone and artefacts resulting in the more sparse distribution noted in Horizons 1 and 3. The time period over which Horizon 3 accumulated is unknown, and may have been quite short, especially if some deliberate backfilling occurred (pp. 231–232). The miniature vessel described below almost certainly comes from Horizons 2 or 3, but unfortunately was recovered in the spoil, so was not precisely located.

A crucial factor in any analysis of the Entrance Shaft fill is the period over which it accumulated. At present there is only the date from the aurochs in Horizon 1 which provides an indication of the date of termination of the main part of the fill. A grant from SERC has enabled the submission of three further samples to the Oxford Radiocarbon Accelerator Laboratory (detailed below) which should solve this problem.

Horizons a–c: 0 to −6 m

These horizons were not well enough recorded to provide accurate description of the deposits. The plan and sections drawn by Dr R. F. Everton (FIG. 5) illustrate the relative locations of the horizons for the original area of excavation (to the north of the shoring line). Subsequent excavation was to the south of the shoring line, and there is no record of the upper six metres of deposit from this zone.

Horizon 1: −6 m to −14.9 m

A zone of generally clean-washed boulders with few bones. Aurochs bones were recovered at a depth of about eleven metres at find location (1) (FIG. 8). These have been radiocarbon dated to 1295 ± 37BC (BM-731), and the fact that this material must relate to human activity is demonstrated by the evidence of butchery on the horncore, described in full by Everton (1975; Everton and Everton, 1977). A pelvis and vertebrae, also of aurochs, were in articulation, lying along the axis of the rift close to the eastern wall and at a similar depth. The evidence of butchery highlights human activity, and possibly the emplacement of the bones was by human agency. The 'horizon' is not well enough defined to warrant giving the level a separate horizon designation. No further bones were discovered below this until two human crania were recovered at the junction with H2.

Horizon 2: −14.9 m to −15.6 m, the 'Beaker layer'

A heavy 'clay layer' passing into a clean-washed stony layer with an indistinct junction. This horizon contained a continuous layer of mixed bone material across the whole rift, and several centimetres thick in places. The upper part of this horizon contained mostly human bones, and beneath these was a densely concentrated layer of non-human bones (FIG. 9). The discovery of the Beaker from this horizon, at a depth of 15.47 m, is described above (p. 178). The human bones were all apparently disarticulated and indiscriminately mixed. Many of the bones bear cut-marks at or near articulation points (FIG. 20), and one such specimen—a scapula—is being dated. Bearing in mind the Late Bronze Age date obtained for the aurochs in H1 and the typological evidence from the Beaker (pp. 202–203), this horizon may tentatively be dated to the Early Bronze Age or the Beaker period.

FIG. 20—HUMAN BONE WITH CUT-MARKS, FROM HORIZON 2 (C. 15.2 M DEPTH)
Photograph: B. M. Levitan

Horizon 3: −15.6 m to −20.05 m

A zone of clean-washed stones and regular clay bands but little archaeological material. Bones were recovered at depths of 17.7 m and 19.4 m. At a depth of 18.8 m pieces of black pottery including one rim were found (FIG. 8).

Horizon 4: −20.05 m to −20.79 m, the 'dagger layer'

Clean-washed stones passing into a distinct 'clay layer'. This horizon contained a number of foetal human bones, some non-human bones, and the flint, stone and bone artefacts. The flint dagger was found at a depth of 20.49 m. The dating of this horizon is problematic since the dagger is of a date similar to, or slightly later than, the Beaker (see pp. 207–209). This implies a short time-span between the two horizons, and human material from this horizon has been submitted for dating.

THE NEOLITHIC/EARLY BRONZE AGE MATERIAL

J. S. Thomas

The assemblage of Beaker-age material was found during the excavation of the Entrance Shaft, 1972–1976. The circumstances of recovery have been described above, and the locations of the artefacts are shown in FIG. 8. The objects labelled [a] to [z] are those illustrated in FIGS. 21–27.

The Material

The Beaker [a]

The vessel, whilst broken, was complete up to the neck (FIG. 21). All the sherds were recovered from within about 0.1 m^2. Only one sherd is present from the neck and the rim is not represented. The height of the pot would have been greater than 190 mm; the greatest diameter is 165 mm (at the belly carination). The fabric is of a hard brick-red paste, with a grey-black core. The surface has been smoothed inside and out. There are relatively infrequent, very small inclusions of stone, perhaps calcite. The walls of the vessel vary in thickness from 6 mm to 10 mm, reaching their thickest at the belly. There is a pronounced increase in the thickness of the base towards its centre.

The decoration of the Beaker has been executed using a number of forms of impression. The overlapping of some of the designs makes it clear that the first stage of decoration had been the definition of a number of horizontal linear zones with the use of a toothed comb, or perhaps a roulette. These zones were infilled using comb and perhaps fine cord maggots.

The Beaker is rather difficult to assign to any of Clarke's (1970) typological groups. The shape of the vessel appears to be intermediate between Clarke's II and IV, although possessing none of the sinuous curve normally found on Wessex/Middle Rhine or Northern/North Rhine Beakers. The combination of the belly carination and the pronounced separation of the neck and body is perhaps unusual, resulting in an angular S-shaped profile.

The organization of decoration on the vessel is in Clarke's Style c, that is in three broad and separated zones. This arrangement is often found on those Beakers with an emphasized waist (particularly the Developed and Late Northern Beakers). The band of decoration on the neck, however, is unusually thin. The decorative traits employed are largely drawn from the Basic European Motif Group, namely motifs 1, 5 and 10. The herring-bone motif 19 found filling the uppermost band of the upper belly decorative zone is more characteristic, originating with Northern/North Rhine Beakers and frequently employed within the Northern Beaker tradition.

On balance the Charterhouse Warren Farm Swallet Beaker probably fits best into the Developed Northern Beaker group (N2). N2 Beakers have a very variable shape range (Clarke, 1970, p. 162), and tend to incorporate decorative elements previously found on Wessex/Middle Rhine and Northern/North Rhine Beakers. They tend to have a waist diameter smaller than total height, and convex or straight necks, well distinguished from the body. The typical decorative styles in use were b and c, 'with broad bands either of a single broad zone or many conjoined narrow zones, often in a "three banded" effect emphasising the shape elements' (Clarke, 1970, p. 163). Although motif 19 from the Northern Motif group is present, none of motifs 22–27 are, indicating that the vessel is not of Late Northern type.

FIG. 21—THE BEAKER (a) FROM THE ENTRANCE SHAFT, HORIZON 2

Beaker Sherds [b]

Two further sherds, possibly from a single vessel, were recovered (FIG. 8). They are buff/brown in colour (Munsell: 10 YR 3/2) with a smooth, soapy surface, fairly hard, but with a crumbly fracture. They contain frequent, moderately sorted angular inclusions of flint and grog (each c. 0.5–3.0 mm diameter). The paste is c. 7 mm thick. One of the sherds is a plain base sherd, the other has horizontal comb lines and cross-hatches of incision (FIG. 22: b). This decoration alone is not diagnostic, other than to say that it may be contemporary with the complete vessel.

The Miniature Vessel [c]

This small vessel, only 37 mm high, is of very poorly-fired paste, black-brown to light red-brown in colour (Munsell: 7.5 YR 2/1 to 10 R 6/6) (FIG. 22: c). The inclusions consist of poorly-sorted large fragments of grog.

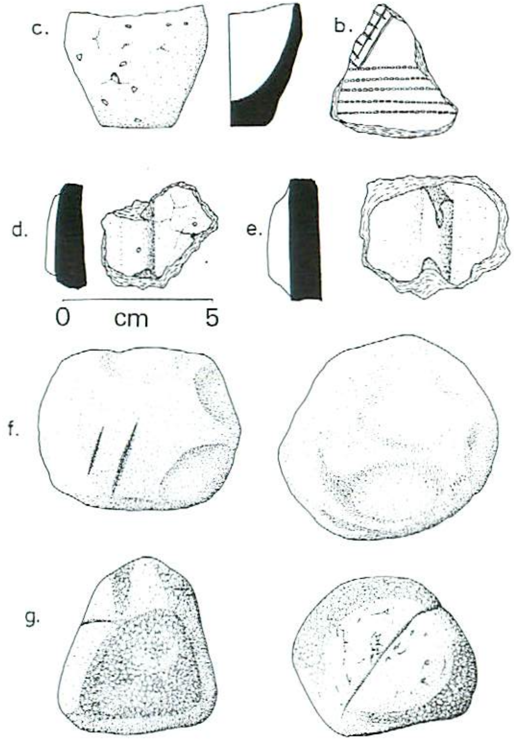

FIG. 22—BEAKER SHERD (b); MINIATURE VESSEL (c); ? GROOVED WARE SHERDS (d, e); QUARTZITE HAMMERSTONES (f, g). ALL FROM THE ENTRANCE SHAFT

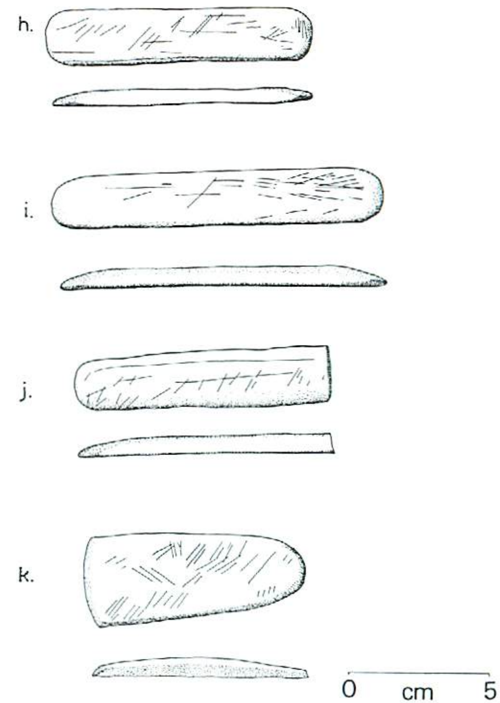

FIG. 23—THE 'SPONGE FINGER STONES' (h–k) FROM THE ENTRANCE SHAFT, HORIZON 4

Such a vessel would not be out of place in an Early Bronze Age context, being similar in form to the accessory vessel found with a Collared Urn at Icklingham, Suffolk (Longworth, 1984, plate 29), and in size to cups from Urn burials at Frampton 4 (Dorset), Prestonkirk (Lothian) and Leuchars (Fife) (*ibid.*, plates 35, 156, 208). Unfortunately the provenance of this vessel is uncertain because it was found on the spoil heap. It does seem certain, however, that it comes from the lower part of Horizon 2 or below (Horizons 3/4). This is on the basis of the section of the spoil heap from which it came and on the colouration of the matrix which was in it (Audsley, pers. comm.).

?Grooved Ware Sherds [d] and [e]

Two sherds of what appears to be Grooved Ware (or conceivably Bronze Age barrel urn) are possibly from Horizon 3. There is some uncertainty about their provenance but they are definitely from the Horizon 3–4 zone, and it seems likely that they are the black pottery from Horizon 3 shown on FIG. 8. Both sherds are undecorated, save for cordons (FIG. 22: d, e).

The larger sherd is black in colour (Munsell: 10 YR 1.7/1) with a smoothed surface and an extremely crumbly fracture. The very poorly-sorted inclusions consist of large fragments of grog and sparse small fragments of shell. The sherd has a plain vertical appliqué cordon. The smaller sherd is similar, but with a brown (Munsell: 7.5 YR 4/4) outer surface and a cordon which is pinched-up rather than applied. Both sherds would fit into the Durrington Walls subclass of Grooved Ware (Wainwright and Longworth, 1971), as does the Grooved Ware sherd from Soldier's Hole (in Wells Museum), the nearest local occurrence of this pottery (FIG. 28).

Hammerstones or Pounders [f] and [g]

Two large quartzite pebbles. The first is 76×67×55 mm, with an uneven but smoothened surface (FIG. 22: f). Dark grey in colour. One side has a groove or slot c. 27 mm long, clearly of human manufacture. The second is of finer-grained, red-grey quartzite, 69×58×51 mm. The edges of this stone are clearly rubbed, and the edges and sides bear clear signs of battering.

The 'Sponge Finger Stones' [h] to [k]

Five slate items were found (FIGS. 8 and 23):

[h] 93×20 mm. Upper surface curved in cross-section, lower surface flat. Rounded at both ends, slightly mottled, green/black in colour (Munsell: 5Y 2.5/2). The stone is very smooth all over its surface, but appears to be particularly polished at each end. There are linear and transverse striations on the surface which may be the result of use.

[i] 116×19 mm. Rounded at both ends. Mottled dark green/light brown (Munsell: 10 YR 4/2 – 5 Y 2.5/1). Linear striations for the most part along the axis of the object.

[j] 89×20 mm. Rounded at one end, flat at the other—hence similar to one of the stones from West Overton G.6b (Smith and Simpson, 1966). More oval in cross-section than either [h] or [i]. Mottled green/black (Munsell: 10 YR 5/2 – 2.5 Y 2/0).

[k] 72×32 mm. Green/black in colour (Munsell: 2.5 Y 2/0). While it is of identical material to the other four stones, this object is distinctly 'axe-shaped'. Nonetheless, it is quite flat on one side, and the striations which may be evidence of wear run transverse to the axis of the object, suggesting that it was not used as an axe.

A fifth stone was not available for study at the time this material was examined in Wells Museum as it had been removed for conservation. There has not been an opportunity since then to see this object.

Pebble

A highly polished black pebble, 52 × 22 mm. It was found with the 'Sponge Finger Stones'.

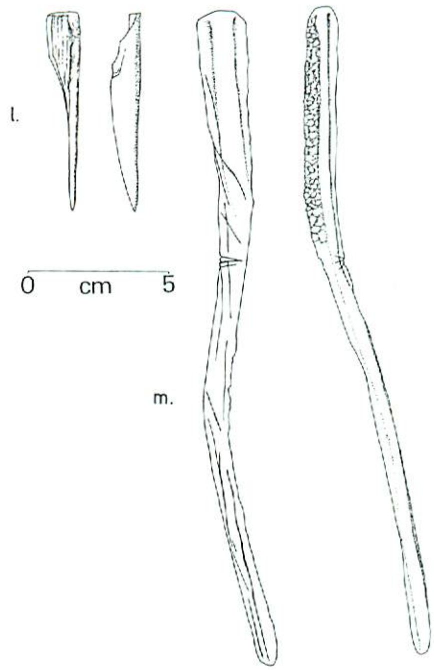

FIG. 24—BONE PIN (l) AND ANTLER SPATULA (m) FROM THE ENTRANCE SHAFT

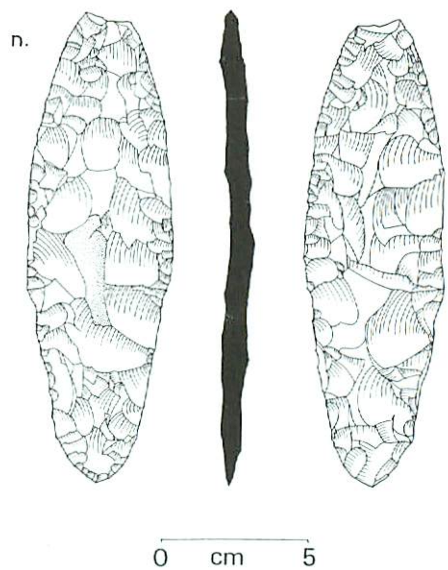

FIG. 25—FLINT DAGGER (n) FROM THE ENTRANCE SHAFT

Bone Pin [l]

A pin, 72 mm long, shaped smoothly to a point at one end and broken at the other (FIG. 24: l). The item was made from a fragment of pig tibia. Bone pins are a characteristic Grooved Ware association (Wainwright and Longworth, 1971).

Antler Spatula [m]

Length 235 mm, maximum breadth 17 mm. Probably from red deer (*Cervus elaphus*) antler (FIG. 24: m). Two pronounced grooves running down the length of the object suggest the use of groove and splinter technique in its manufacture. One side of the spatulate end is exceptionally smooth, suggesting wear from use, the opposed side is rough and uneven. At about midway along the shaft are three cut-marks.

Flintwork [n] to [z]

The whole assemblage is made from grey to brown mottled flint (Munsell: 5 Y 2.5/1 – 2.5 Y 3/2). The flint is of good quality, with a fine fracture. Some cortex is present.

The dagger [n]: 164×50×9 mm. A finely flaked blade (FIG. 25). Rather slimmer and more lenticulate than Beaker-associated daggers from Garton Slack 37, Yorkshire; Little Downham, Cambridgeshire; or Ystradfellte, Powys (Grimes, 1931; Green *et al.* 1982, 498) for example. On most of these other daggers, the form of the object has been created by the removal of large primary flakes, and a band of smaller secondary flakes taken from around the margins of the blade to provide an edge. In the Charterhouse Warren Farm Swallet example the distinction between primary and secondary working is not so pronounced, although a number of small removals can be seen around the thicker end of the dagger, presumably the cutting edge. In both shape and working the Charterhouse Warren Farm Swallet dagger finds a closer parallel in the blade from Ffair Rhos, Dyfed (Green *et al.*, 1982).

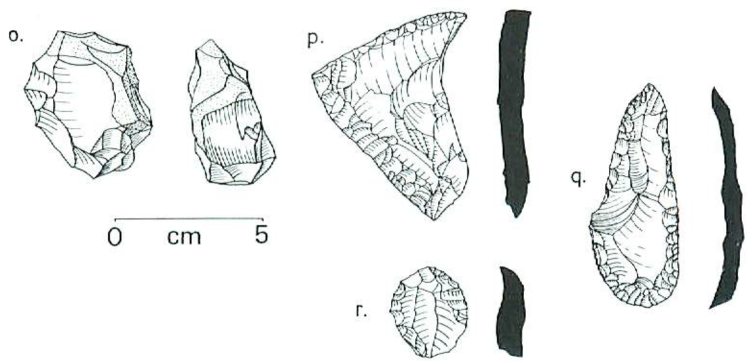

FIG. 26—FLINT OBJECTS FROM THE ENTRANCE SHAFT: THE CORE (o); LARGE TRIANGULAR OBJECT (p); SCRAPERS (q–r)

Other items: There are eighteen other flint implements. One of these (FIG. 26: p) is a particularly finely-worked item, triangular in shape. It is made on a very large flake, and is only worked on one side. Two edges have fine retouch; the third has been crudely snapped.

There are three scrapers [q–s], one a large spurred implement, another (found with the infant bones in Horizon 4: FIG. 8) a much smaller 'button' scraper of the type generally associated with Beakers. There is one crude multiplatform core [o], two roughly retouched fragments, two points or borers, and a small flake which may come from a polished axe.

The remaining items are mostly knives, and have all been made on relatively slender flakes [t–z] (FIG. 27). One cortical flake with a large hinge fracture shows retouch on an inner angle, perhaps indicating a spokeshave.

Discussion

The assemblage from Charterhouse Warren Farm Swallet presents a number of problems of interpretation. Firstly, it has to be considered whether the late Neolithic and Early Bronze Age items could represent a single episode of deposition. Most of the Beaker-associated items found in the Entrance Shaft are distinctly 'late' associations, usually found with Beakers of Lanting and van der Waals' (1972) Steps 5 and 6. An antler spatula and two 'sponge finger stones' were found with the late Beaker burial at West Overton G.6b, Wiltshire, for instance (Smith and Simpson, 1966, p. 134). Flint daggers are most often found with Southern Beakers (S1–S3) (Clarke, 1970, p. 448). A

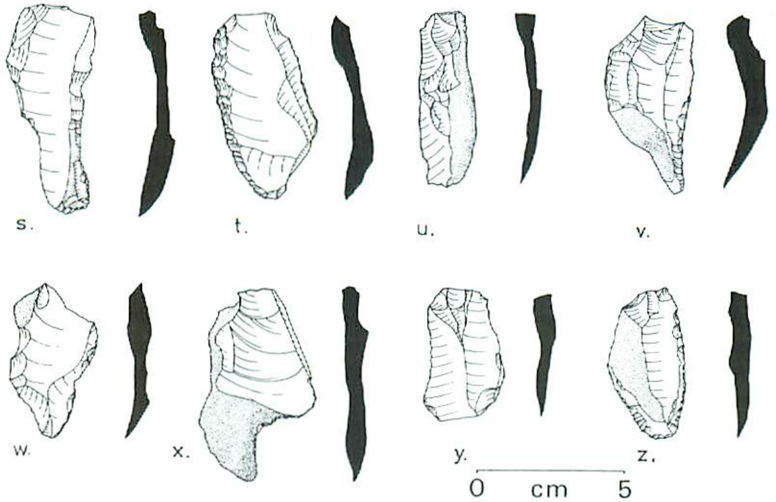

FIG. 27—FLINT FROM THE ENTRANCE SHAFT: RETOUCHED PIECES (S–Z)

flint dagger was found with a Step 3 Beaker, however, at Lockeridge, Wiltshire (Lanting and van der Waals 1972, p. 37), and antler spatulae have been associated with Wessex/Middle Rhine Beakers at Mere 6a, Wiltshire and Stanton Harcourt, Oxfordshire (Hoare, 1812, p. 44; Case, 1956). Indeed, two spatulae and one 'sponge finger stone' were found with an All-Over-Corded Beaker in Wetton Mill rock shelter, in the Manifold Valley, Staffordshire (Kelly, 1976). Chronologically, then, the association of dagger, stones and spatula with an N2 Beaker is not impossible, although the assemblage as a whole might be expected to be a little later in date than the Beaker alone suggests. Nonetheless, one should note the present imprecision concerning Beaker dating (Gibson *et al.*, 1983). It is quite possible that particular Beaker styles were in use for a very long time (Longworth in Wainwright, 1979). The presence of sherds of Grooved Ware (Horizon 3) and a miniature vessel (Horizon 3 or 4) of a type which one might expect to find associated with Collared Urns or Food Vessels compound these problems. It is just within the bounds of possibility that all of these ceramics might be in use contemporaneously (at, say, a date of 1700–1600 BC). The alternative is to see the various items as representing a series of placed deposits, relating to a number of depositional episodes over a period of many years. The fact that the Beaker occurs in a horizon which is five metres above the horizon containing most of the other artefacts argues for the latter, unless it can be supposed that the intervening deposit (Horizon 3: see FIG. 8) accumulated extremely quickly (and this seems unlikely). Human bones from Horizons 2 and 4 have been submitted for dating, and the results will greatly help to resolve the chronological difficulties.

The richness of the assemblage is itself remarkable. Spatulae and 'sponge finger stones' have been found together at West Overton G.6b and Wetton Mill (the latter, interestingly, a cave site), but the Charterhouse Warren Farm Swallet find of five stones must be the largest number ever found together. Both spatulae and 'sponge finger stones' have been interpreted by Smith (Smith and Simpson, 1966, p. 134) as leather workers' tools, suitable for rubbing fat into the hide and applying a final burnish. Clarke (1970) preferred to consider the slates as whetstones, suggesting a parallel with the Wessex

Culture perforated whetstone pendants. The wear traces on the present examples do not shed any particular light on this question, although the fact that one stone is shaped as an axe is of interest, given the continued importance of axes throughout the Neolithic and Bronze Age (Barrett, 1985, 103) and the replication of axes in a variety of media: for instance, the chalk axes at Woodhenge, Wiltshire (Cunnington, 1929). It may indicate that these were highly-prized items, a conclusion already indicated by their recovery from Beaker graves (above).

The context from which the items were recovered also requires consideration. The location of the Beaker (FIG. 8) clearly indicates that the vessel may have been purposefully placed in position, and its association with human bones which bear cut-marks is striking. The fact that all of the items find their best parallels in graves or other formal deposits suggests that this is not a chance loss, but the result of one or more episodes of deliberate placement. The importance of this site is further highlighted by the fact that Beaker burials are extremely scarce on the Mendips, given the intensity of barrow investigations by Skinner and by the University of Bristol Spelaeological Society. Only Blackdown T5 (FIG. 28) has a Beaker in a primary position, and here the issue is complicated by the lack of a human body (though there is a patch of burnt material which may indicate a cremation) (ApSimon, 1969). The full Beaker burial rite of contracted inhumation with Beaker, knife, awl, bracer and arrowheads is unrecorded from Mendip, the nearest example being Chew Park (Rahtz and Greenfield, 1977) and perhaps Brean Down (Taylor and Taylor, 1949) (FIG. 28). This is peculiar, since there is no shortage of Beaker pottery in the area.

Many of the other Beaker finds in Mendip may also be deliberate deposits, however. At Bone Hole Cave (FIG. 28), a Wessex/Middle Rhine Beaker was found on a limestone slope, associated with five human skulls and animal bones (Cox, 1976). At Chelm's Combe, sherds of Developed Southern Beaker were found scattered in a cave which had served as a burial place in the Neolithic (Balch, 1927). Further Beaker finds came from Sun Hole (Tratman, 1955), Bridged Pot, Soldier's Hole (Balch, 1928), Ebbor Shelter, Rowberrow Cavern (Dobson, 1931, p. 42) and Cockle's Wood Shelter (Hickling and Seaby, 1951). The locations of these sites are shown in FIG. 28.

In some parts of Southern Britain, such as the Thames Valley or Salisbury Plain, indigenous traditions of individual burial in round barrows and ring ditches existed throughout the Neolithic (Kinnes, 1979). These areas tend to be the ones which have large concentrations of Beaker burials from an early date. If we accept Shennan's argument (1976) that the Beaker assemblage represents a package of status items rather than the distinctive material traits of a cultural or racial group (on the grounds that the assemblage coexists with different local domestic artefacts in different parts of Europe), it can be argued that different Beaker assemblages may have been used for different sets of practices. In Mendip where no tradition of Neolithic individual burial existed before the arrival of Beakers, it seems that there was the formal deposition of Beaker pottery, animal bones, flint and fragmented human bones. It is important to point out that the majority of the Beaker sites mentioned above contain pottery of Lanting and van der Waals' Step 5, and thus should be roughly contemporary with the massive deposit of pottery, animal bone and lithics at Gorsey Bigbury henge monument (FIG. 28) (ApSimon *et al.*, 1976). Formal deposition on such large ceremonial works has been considered elsewhere (Richards and Thomas, 1984), and possible parallels with sites such as Gorsey Bigbury henge are discussed below (p. 229 ff.).

THE VERTEBRATE REMAINS

B. M. Levitan

Introduction

The bones from Charterhouse Warren Farm Swallet fall into two major groups according to provenance: (1) the Entrance Shaft and Debris Cone 1; (2) Debris Cone 2 debris flow deposits (FIG. 10). Each of these groups may be divided into: (i) human bones; (ii) non-human bones. This report is divided accordingly. The detailed plans of Bone and Mitchell's Chambers illustrate the locations of the bones (FIGS. 29 and 30), and the bones are plotted separately in FIGS. 31–37.

It should be noted that a large volume of Entrance Shaft fill remains unexcavated. Thus the present sample may only be about half the size of the complete assemblage in the Entrance Shaft.

The bones entered the cave in two deposits: a major portion as part of a series of debris flows from Mitchell's Chamber, group 2 (pp. 194–197), and a second from the Entrance Shaft, group 1. The bones from group 2 form a secondary deposit, though those from group 1 are probably in a primary

TABLE V—*Summary of species from fill of Entrance Shaft and Debris Cone 1*

Species	*Horizon 2*		*Horizon 3*		*Horizon 4*		*Debris Cone 1*		*Entrance Shaft* Σ	
	No. bones	%	No. bones	%	No. bones	%	No. bones	%	No. bones	%
Cattle (*Bos taurus*)	105	37.8	78	92.8	45	52.9	56	50.0	284	50.8
Sheep (*Ovis aries*)	24	8.6	1	1.2			8	7.1	33	5.9
Goat (*Capra hircus*)	2	0.7	3	3.6	1	1.1			6	1.1
Ovicaprid (*Ovis/Capra*)	77	27.7	1	1.2	6	7.1	7	6.3	91	16.3
Pig (*Sus domesticus*)	27	9.7	1	1.2	28	32.9	31	27.7	87	15.6
Horse (*Equus caballus*)	1	0.4							1	0.2
Dog (*Canis familiaris*)	41	14.7			5	5.9	3	2.7	49	8.8
Red deer (*Cervus elaphus*)	1	0.1					3	2.7	4	0.7
Roe deer (*Capreolus capreolus*)							2	1.8	2	0.4
Aurochs (*Bos primigenius*)							2	1.8	2	0.4
Σ larger mammals	278	29.5	84	90.3	85	60.7	112	73.7	559	42.2
Shrew (Soricidae)	5	6.8			1	10.0			6	7.2
Vole (Microtinae)	27	37.0			5	50.0			32	38.6
Mouse (Muridae)	2	2.7							2	2.4
Weasel (*Mustela nivalis*)					1	10.0			1	1.2
Small mammal	39	53.4			3	30.0			42	50.6
Σ small mammal	73	7.8			10	7.1			83	6.3
Bird (species not identified)	6	0.6			2	1.4			8	0.6
Frog (*Rana temporaria*)	14	1.5			6	4.3			20	1.5
Human (*Homo sapiens*)	204	21.7			24	17.1	1	0.7	229	17.3
Cattle-size	294	80.3	8	88.9	3	23.1	18	46.2	323	75.6
Sheep-size	54	14.8	1	11.1	10	76.9	21	53.8	86	20.1
Other indet.	18	4.9							18	4.2
Σ indet.	366	38.9	9	9.7	13	9.3	39	25.7	427	32.2
Total	941	71.0	93	7.0	140	10.6	152	11.5	1,326	

Note: possibly all the other indet. category is human bone (very small fragments); a number of the cattle bones may be aurochs (see text). Horizon 1, which contains aurochs, is not included due to uncertainty of provenance for other bones (see text).

context. The main cave deposit (group 2) may contain bones of several periods, but the impression is of similarity and uniformity. At least some of the bones in this deposit must date from no earlier than the Neolithic, since domestic animals are represented, but the presence also of aurochs argues for a latest date of Bronze Age. A grant awarded by NERC in January 1988 will enable the submission of four samples for radiocarbon dating, and it is hoped to resolve these, and other, taphonomic, questions using this grant.

The bones from group 2 were discovered at the same time as those from Debris Cone 1 (group 1), and occupy most of the Bone Chamber and part of Mitchell's Chamber (FIGS. 10, 29 and 30). The fact that the majority of the bones in the chambers are *in situ* and undisturbed is the result of the strong conservation attitude taken by the Moodys and their team.

The list of species (TABLES V and VI) is very characteristic of an archaeological deposit with domestic mammals in the majority, and wild species rare. The presence of wolf and aurochs is of great importance, particularly in terms of dating, the latter being not later than Early Bronze Age (Grigson, 1981, p. 219). It should be noted that the number of aurochs bones is probably under-represented because some of the bones identified as cattle may be aurochs. This is most likely in the cave deposits because the bones were examined *in situ* without removing them or cleaning them; it is less likely in the case of the bones from the Entrance Shaft excavation. The presence of human bones is also of major interest.

TABLE VI—*Summary of species from Debris Cone 2 (Mitchell's and Bone Chamber debris flows)*

Species	*Bone Chamber*		*Mitchell's Chamber*		*Σ debris flows*	
	No. bones	%	No. bones	%	No. bones	%
Cattle (*Bos taurus*)	390	45.2	37	54.4	427	45.9
Sheep (*Ovis aries*)	39	4.5	3	4.4	42	4.5
Goat (*Capra hircus*)	6	0.7			6	0.6
Ovicaprid (*Ovis/Capra*)	86	10.0	7	10.3	93	10.0
Pig (*Sus domesticus*)	121	14.0	7	10.3	128	13.8
Horse (*Equus caballus*)	1	0.1			1	0.1
Dog (*Canis familiaris*)	171	19.8	7	10.3	178	19.1
Badger (*Meles meles*)	1	0.1			1	0.1
Wolf (*Canis lupus*)	5	0.6	1	1.5	6	0.6
Red deer (*Cervus elaphus*)	33	3.8	5	7.3	38	4.1
Aurochs (*Bos primigenius*)	9	1.0	1	1.5	10	1.1
Σ larger mammals	862	39.4	68	18.1	930	36.3
Mole (*Talpa europaea*)	2	1.6			2	1.0
Shrew (Soricidae)	12	9.5	1	1.3	13	6.4
Bat (Chiroptera)	15	11.9	24	31.2	39	19.2
Vole (Microtinae)	45	35.7	28	36.4	73	36.0
Small mammal	52	41.2	24	31.2	76	37.4
Σ small mammal	126	5.8	77	20.4	203	7.9
Bird (species not identified)	25	1.1	2	0.5	27	1.0
Frog (*Rana temporaria*)	50	2.3			50	1.9
Human (*Homo sapiens*)	74	3.4	7	1.9	81	3.2
Cattle-size	379	36.1	95	42.8	474	37.3
Sheep-size	670	63.9	127	57.2	797	62.7
Total	2,186	85.3	376	14.7	2,562	

Note: All but 6 of the red deer bones from Bone Chamber are antler; all red deer from Mitchell's Chamber are antler. Aurochs are probably under-represented as some bones identified as cattle may be aurochs (see text).

Group 1: the Entrance Shaft and Debris Cone 1

Although the location of the aurochs bones from Horizon 1 was recorded when discovered, the majority of the bones from this horizon were not plotted or recorded. Much of this material is also now widely dispersed, so it was thought not to be worth while analysing the few bones from this horizon that are readily available for study. The same is true of the bones from the uppermost six metres of the shaft, from Horizons a to c (FIG. 5). It should be noted that Horizon 1 spans the period from the placement of the Beaker (Beaker Period) to the Iron Age and Roman inhumations. The dated aurochs bone (Middle Bronze Age) comes from about half way down Horizon 1. There is, therefore, an apparent hiatus between the Middle Bronze Age and the Iron Age which has been observed at other Mendip sites. Since the finds from Horizon 1 were not recorded it is not possible to confirm that such a hiatus actually occurred at this site. Some of the bones are in the possession of A. Audsley, and these will eventually be added to the site archive at Wells Museum. Other bones, particularly those from the upper six metres of deposit (Horizons a–c), are at various locations, but since their provenance was not recorded it does not seem worth trying to track this material down.

The excavated bones and artefacts from Horizons 2 (FIG. 9) and 4 of the Entrance Shaft almost certainly represent material deliberately placed in the shaft—some as rubbish, but possibly also a 'ritual' element being involved if the nature of the fine collection of artefacts is taken into consideration (p. 202 ff.). The other bones and artefacts from the Entrance Shaft may have accumulated accidentally (e.g. pit-fall deaths) or as a more occasional dumping of rubbish, as evidenced by a sparser distribution in Horizons 1 (from field notes) and 3. The location of the Debris Cone 1 bones at the base of the Entrance Shaft suggests a direct relationship with the shaft fill. The material in Debris Cone 1, therefore, might also be associated with these practices. These points will be discussed below when it will be shown that the human remains probably relate to ritual practices, whereas the non-human bones result from domestic activities. The Beaker and other artefacts are from five metres and more above Debris Cone 1, so the date of Debris Cone 1, whilst earlier than the artefacts, is unknown. An aurochs bone from Debris Cone 1 (FIG. 16) is being radiocarbon dated, and this, together with dates from the higher horizons, should provide a clear chronology for the Entrance Shaft fill.

The main problem in dealing with the bones from Debris Cone 1 is to decide which are Entrance Shaft fill, and which are from Debris Cone 2 debris flows.The indication from the sediment analysis (p. 195) is that much of the lower part of Debris Cone 1 was covered by overflow from the debris flows, so that many of the bones left on its surface are derived from Debris Cone 2. If this is the true situation then possibly only the aurochs skull described above, plus the bones within a few centimetres of it, relate to Debris Cone 1. There are two possibilities: (a) the bones in Debris Cone 1 and the Entrance Shaft fill are qualitatively different from those in the debris flow deposits; (b) the two groups of deposits may be of different date. The second alternative is being investigated by means of dating four bone samples. The first alternative is considered below. The bone distributions (FIGS. 31–37) provide evidence for the relationship of debris flow material with the Debris Cone 1 deposit. The overall bone distribution and the cattle/sheep/goat and pig/dog distributions imply that there are two distinct deposits separated by an area of low bone concentration at the base of Debris Cone 1: this is discussed in more detail below (p. 224).

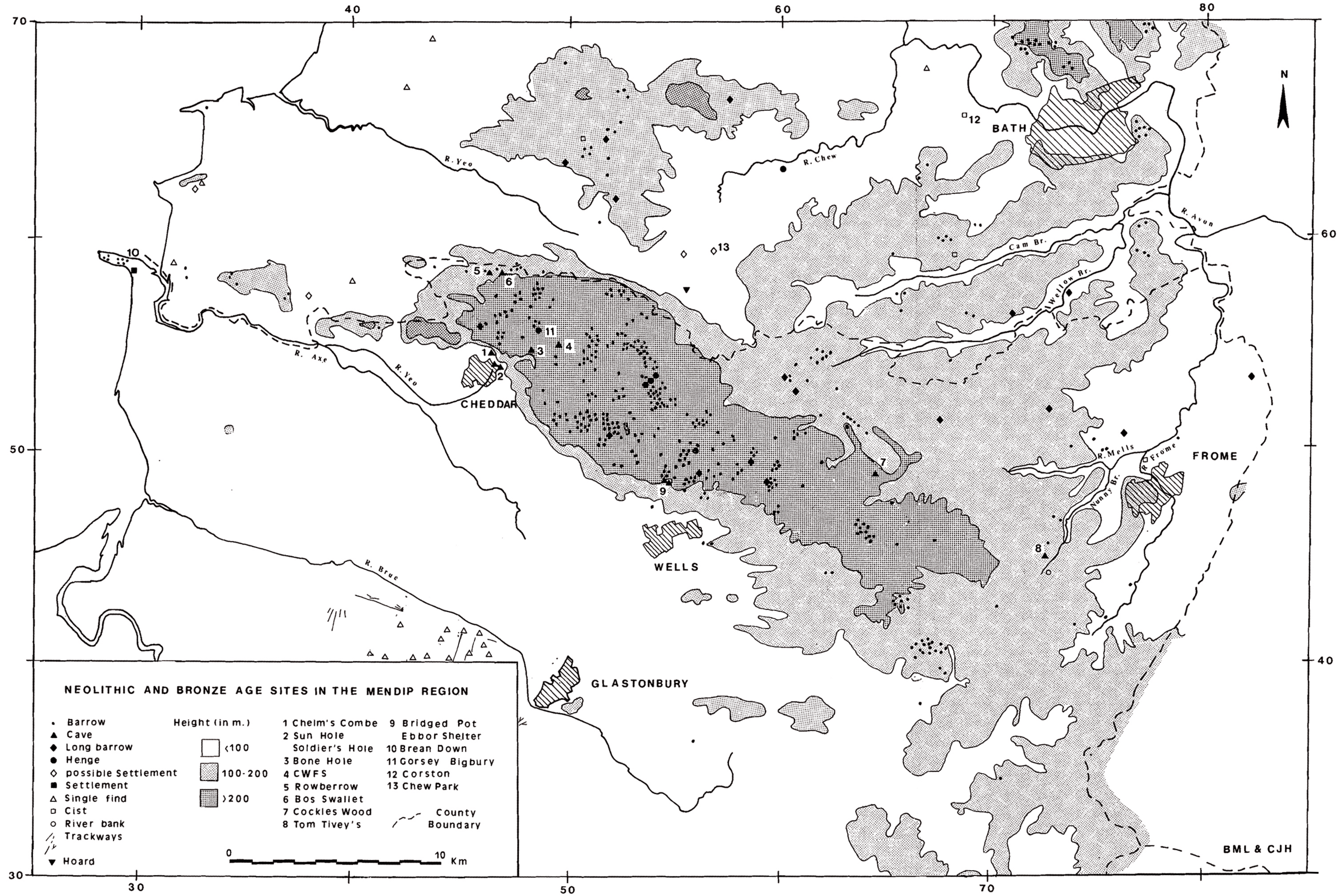

FIG. 28—ARCHAEOLOGICAL SETTING OF CHARTERHOUSE WARREN FARM SWALLET

FIG. 29—PLAN OF BONE CHAMBER

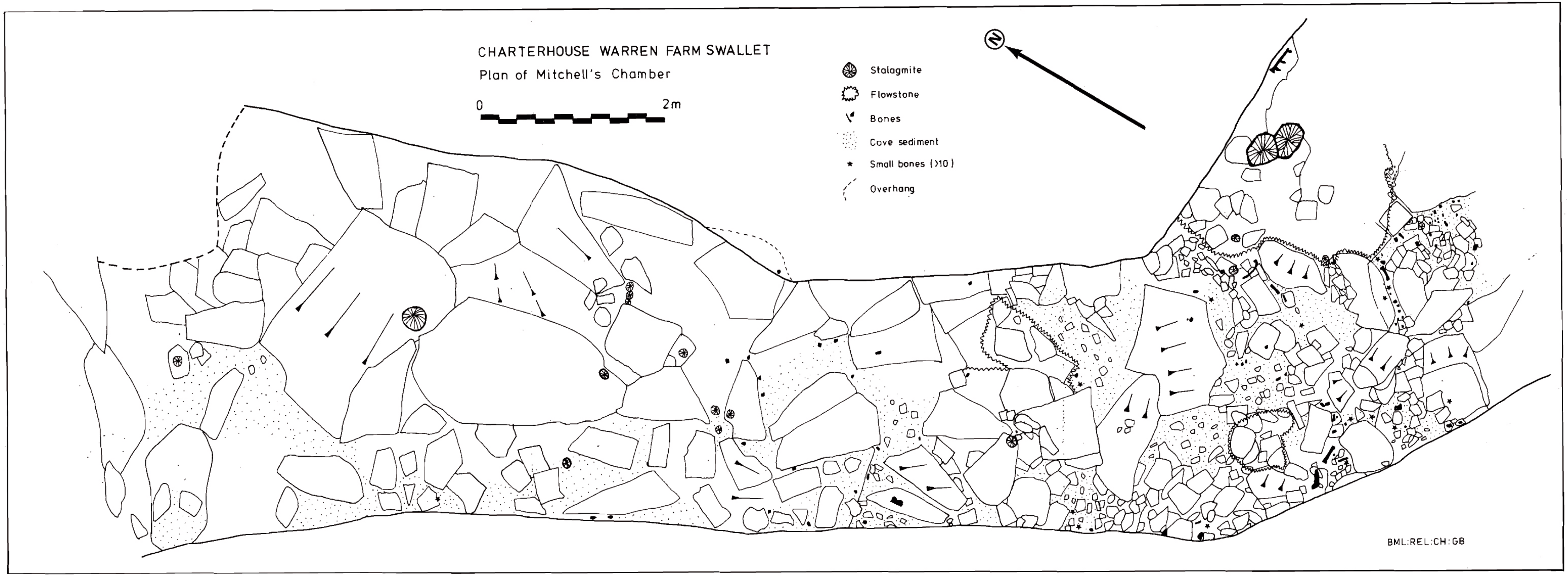

FIG. 30—PLAN OF MITCHELL'S CHAMBER

TABLE VII—*Summary of human bones present in Charterhouse Warren Farm Swallet*

Anatomical part	*Number of fragments*	*Comments*
Entrance Shaft fill and Debris Cone 1		
ENTRANCE SHAFT (1972–6 excavations)		
Horizon 2		
Skull	48	mostly <25% complete; include 6 with cut-marks & 7 burnt; infant to adult represented
Teeth	16	upper and lower teeth; 4 are burnt
Mandible	6	1 pair from infant; 1 right, permanent dentition in wear; 1 right, M2 in wear M3 visible in crypt; 1 left, infant 1 left ramus fragment
Rib	24	=rib heads (plus 16 shaft fragments)
Cervical vert.	8	2 atlas, 1 axis
Thoracic vert.	3	
Sacrum	1	cranial part, fused epiphysis
Indet. vert.	5	1 foetal, 2 infant
Clavicle	2	
Scapula	12	3 infant; 1 with cut-marks
Humerus	7	3 infant, 2 juvenile, 2 adult
Radius	4	1 infant
Ulna	8	2 juvenile; one with canid chewing marks
Metacarpals	2	1 II/III; 1 IV
1st Phalanx	8	2 infant; digits II–IV represented
2nd Phalanx	1	infant
Pelvis	4	
Femur	2	juvenile
Patella	3	
Tibia	7	1 infant; 1 juvenile
Fibula	4	3 juvenile
Tarsus	3	
Metatarsal IV	1	
1s Phalanx	2	digits II/III
2nd Phalanx	2	digits II/III or IV
3rd Phalanx	1	infant
Indet.	6	long bone pieces; one possibly deliberately split
Horizon 4		(all foetal (f) and infant (i))
Skull	1	f: maxilla
Rib	4	f
Indet. vert.	11	f
Humerus	2	f: 1 left, 1 right
Radius	1	i: left
Ulna	1	i: right
Pelvis	2	i/f: left
Femur	1	f: left
1st Phalanx	1	f
BONE CHAMBER		
Thoracic vert.	1	fused central epiphyses
Debris Cone 2 (debris flows)		
BONE CHAMBER		
Skull	14	all <25% complete
Upper 1st molar	1	in wear
Mandible	1	right side: Pm3/Pm4/M1 in wear
Rib	2	proximal parts present
Cervical vert.	6	5 with fused central epiphyses
Lumbar vert.	1	fused central epiphyses
Sternal elements	3	2=part of one sternum
Humerus	1	<25%, right distal, fused
Radius	4	1 right, 25%, proximal fused 2 left, 51–74%, distal fused 1 left, <25%, proximal fused
Ulna	4	1 midshaft fragment 2 proximal fused (1 left) 1 left midshaft
Carpal	1	(possibly Mitchell's Chamber)
1st phalanx	7	6 hand, 2nd or 3rd digit 1 toe, 2nd or 3rd digit
Pelvis	3	1 male, right 1 left 1 perinatal (?)
Femur	4	1 perinatal (?) 1 left, proximal fused, <25% 1 left, distal fused, <25% 1 proximal fused, <25%
Tibia	4	3 midshaft, <25% 1 right, distal fused, <25%
Tarsal	2	
Metatarsal IV	2	1 left, fused, whole 1 left, proximal fused, 75%
Metapodial	1	distal fused, 51–74%
MITCHELL'S CHAMBER		
Skull	1	fragment <25%
Clavicle	1	fragment c. 75%
Humerus	1	left, distal fused, >75%
Femur	2	1 left, distal fused, <25% 1 proximal fused, <25%
Astragalus	1	left, whole
1st Phalanx	1	foot, digit I, whole

% = proportion of bone present

Group 1.i: Human Bones

The importance attached to caves in the Neolithic and Bronze Age periods, and highlighted in this report, was not confined to these periods. A number of Iron Age and Roman inhumations were recovered from the uppermost levels of the Entrance Shaft, and have been briefly described by Everton (1974). These bones are not considered here because they were poorly recorded and many are now missing. Nevertheless a full consideration of such deposits from Mendip caves, which could more profitably include this site than any discussion here, is long overdue.

TABLE V shows that human bones are concentrated in Horizons 2 and 4, with no human bones from Horizon 3 and only one from Debris Cone 1. In other respects, Horizons 2 and 4 differ: the human bones in Horizon 2 are a mixture of ages, including infant, juvenile and adult. In contrast, the human bones from Horizon 4 are all perinatal and infant (TABLE VII). In both horizons the bones were disarticulated and mixed, and a number of those from Horizon 2 have cut-marks on them. These include several fragments of skull, a scapula, a humerus (FIG. 20) and an unidentified piece of long bone shaft (femur or humerus). In addition some of the bones have been burnt, and one bone—an ulna—has canid chewing marks. This implies that the bones were defleshed before being deposited here, and the lack of complete skeletons may result from this practice (though not all of the horizon was excavated, so more human bones are undoubtedly present). Most of the bones are fragmented, only bones such as metacarpals and -tarsals, carpals, tarsals and phalanges being complete.

Horizon 2: Few of the 'adult' bones are ageable or measurable due to the fragmentation. One astragalus has a greatest height of 63.6 mm. There is one fused distal tibia and one unfused distal tibia epiphysis, and a fused proximal ulna. There is also a mandible with fully permanent dentition in wear and a second with second molar well in wear and third molar unerupted. Two right maxillae have second molars erupting. The other 'adult' bones are designated thus on the basis of their general appearance. Of the 204 bones from Horizon 2, 91 are 'adult', eighteen are 'juvenile', nineteen are 'infant' of which seven are possibly from a single individual, and two are possibly 'foetal'. The other 74 bones are mainly fragments of skull which could be either adult or juvenile. It is reasonably clear that the majority of these bones are from adults. None of the bones is complete enough for determination of sex.

Horizon 4: The 24 bones from Horizon 4 are mostly 'foetal' (or possibly new-born), with only three 'infant' (possibly less than a year old). No more than two individuals need be represented.

Debris Cone 1: The single thoracic vertebra (from an adult) is the only human bone from this part of the deposit (see FIG. 32).

Group 1.ii: Animal Bones

The differences between the horizons in terms of human bones are echoed in the case of the non-human bones (TABLE V). Superficially Horizon 2 is different from the other horizons in terms of the lower proportion of mammal bones, but this is probably an artificial difference brought on by the large proportion of human bones (note that the next smallest proportion of mammal bones is Horizon 4 where there is also a high proportion of human bones).

The differences are better seen in the proportions of mammals—excluding small mammals and humans—calculated from the identified mammal totals (TABLE V). The reasons for the differences are that Horizon 2 has a high percentage of sheep and goat (36%) compared with the other levels which range from 9% to 13%, and Horizon 3 can be separated from the others on the basis of the very high cattle percentage (93%), the other levels never passing 53%. The high percentage of cattle in Horizon 3 (TABLE V) is explained by the presence of two skeletons of juvenile individuals. These were not complete, but only the smaller bones are missing, presumably missed by the excavators. Some of the bones may still be present in the unexcavated portion of the horizon. These two skeletons may represent accidental pit-fall deaths as they do not appear to have been butchered and it is hard to imagine why they might have been deliberately thrown in unless, perhaps, diseased. Horizon 4 and Debris Cone 1 appear to be very similar in most respects, though Debris Cone 1 has a larger number of species represented, and a higher percentage of sheep and goat. Indeed there are no positively identified sheep in Horizon 4, but one goat; whereas there are no goats in Debris Cone 1, but eight sheep bones. The two strong common factors are frequencies of cattle and pig bones.

TABLE VIII—*Measurements of bones from Entrance Shaft, Charterhouse Warren Farm Swallet*

Cattle					
Scapula:	SLC 46.2,43.7	GLP 63.0,–	ASG 44.1,42.2		
Humerus:	GLC 240.9,–, –	SD 31.0,28.7, 31.2	BT 68.0,65.0, 72.8	HT 39.8,38.8, 41.4	
Radius:	GL 270.0,–[a],–[a]	BFP 72.5,–,–	SD 35.7,40.2,44.2		
Metacarpal:	GL 184.4,193.0, – , –	BFP 50.5,51.5, – , –	SD 28.9,29.8, – , –	BFD 53.4,53.2, 54.3,55.6	DEM 22.8,22.8, 23.1,23.9
Tibia:	BD 62.3[b]	DD 49.2			
Astragalus:	GLL 64.0	DL 40.1	BD 34.6		
Metatarsal:	GL 2259[a]	SD 24.8	BFD 55.3	DEM 23.8	
Sheep/goat (all sheep unless indicated otherwise)					
Scapula: (G)	SLC 17.3,17.3 11.5	GLP 29.8,28.9 30.6	ASG 19.5,18.5 20.2		
Metacarpal:	GL 128.3,–	BFP 20.7,22.0	SD 12.1,14.0	BFD 23.3,–	Dem 10.9,–
Astragalus:	GLL 26.8,27.2, 26.8	DLL 15.1,14.2, 15.3	BD 17.0,17.4, 16.9		
Pig					
Scapula:	SLC 21.1	GLP 35.5			
Humerus:	BT 77.7	HT 19.4			
Radius:	BFD 30.0				
Astragalus:	GLL 43.9	DLL 23.0	BD 23.2		
Dog					
Scapula:	GLP 30.4	ASG 6.5			
Humerus:	GL 150.6,138.8, – , –	SD 12.6,9.0, 12.3,–	BT 21.9,14.5, 20.7,20.5		
Radius	GL 158.2,–	BP 24.5,17.8	SD 13.6,13.1		
Metatarsal IV:	GL 60.5				
Human					
Astragalus:	GL 63	BD 47.0			

All measurements are in millimetres. (G) = goat.
All measured bones are from Horizon 2 except [a] = Horizon 4, [b] = Horizon 3
Measurements defined in Driesch (1977) except those listed below—all measurement codes capitalized to avoid confusion between lower case L and numeral 1.
Scapula ASG: shortest distance from base of spine to edge of glenoid; Humerus HT: height of trochlea at right angles to BT; Metacarpal DEM: anterior-posterior diameter of medial condyle external trochlea.

Few of the bones are complete enough for measurements to be taken. Although those that were measured are too few for analysis, they are nevertheless an important addition to the small corpus of metrical data from Neolithic and Bronze Age sites in this region (TABLE VIII).

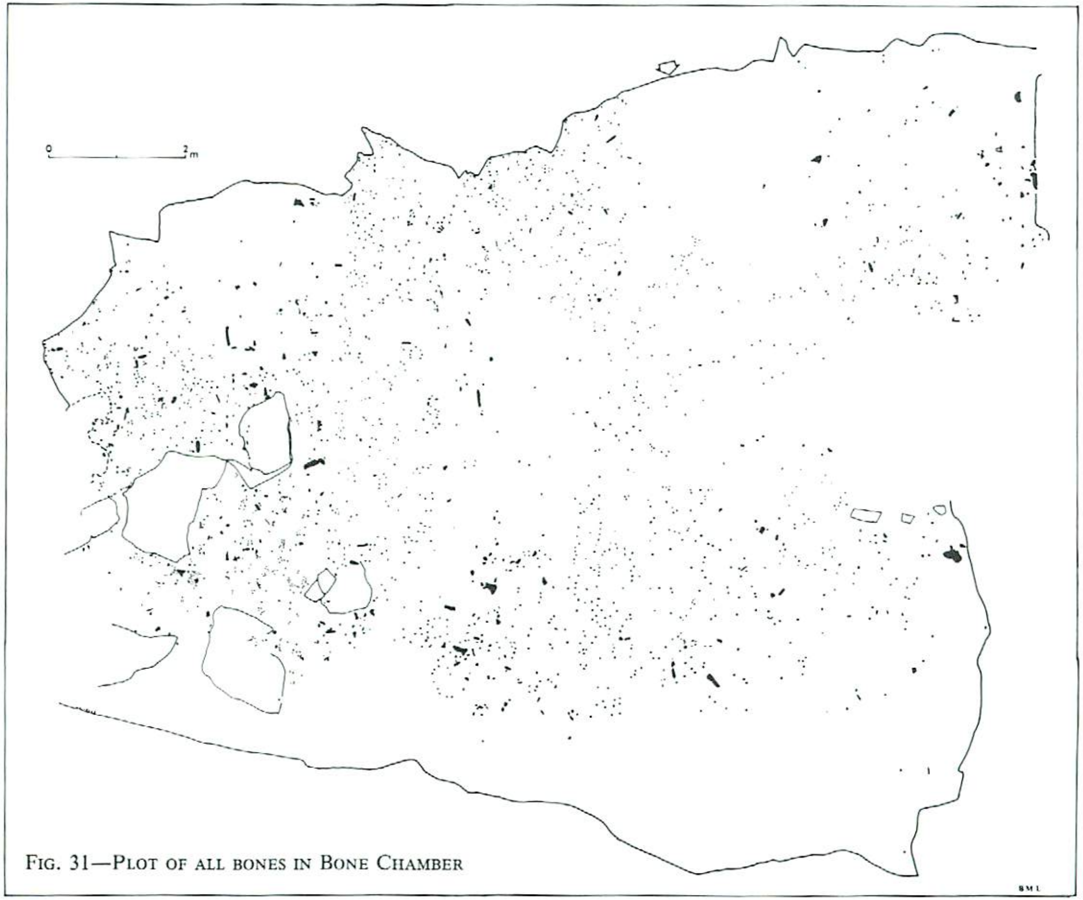

Fig. 31—Plot of all bones in Bone Chamber

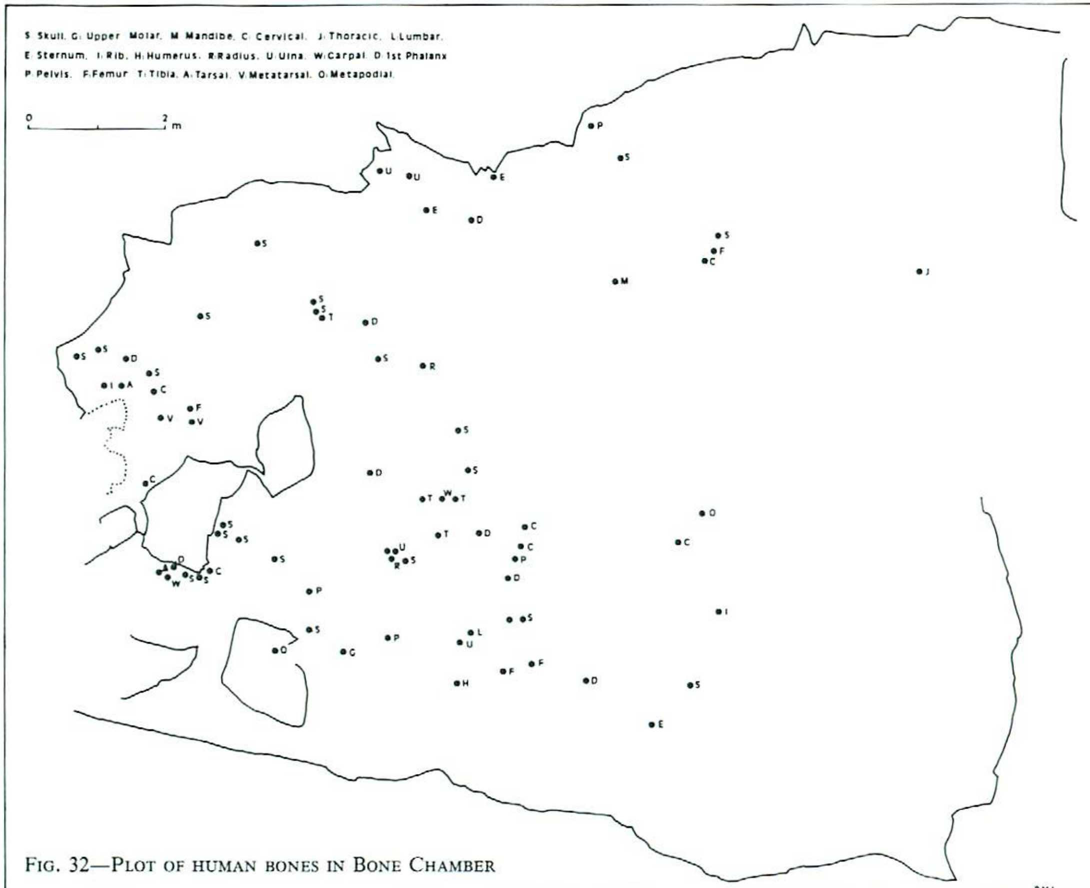

FIG. 32—PLOT OF HUMAN BONES IN BONE CHAMBER

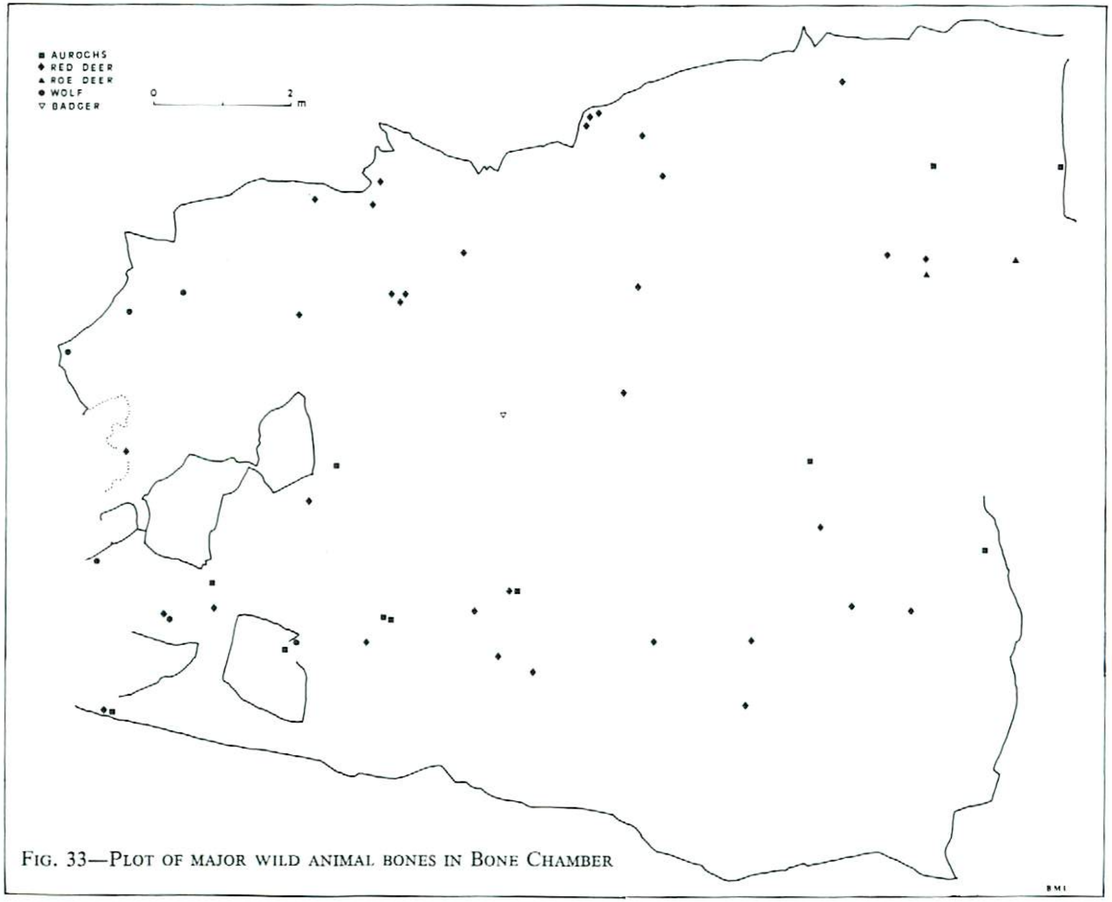

FIG. 33—PLOT OF MAJOR WILD ANIMAL BONES IN BONE CHAMBER

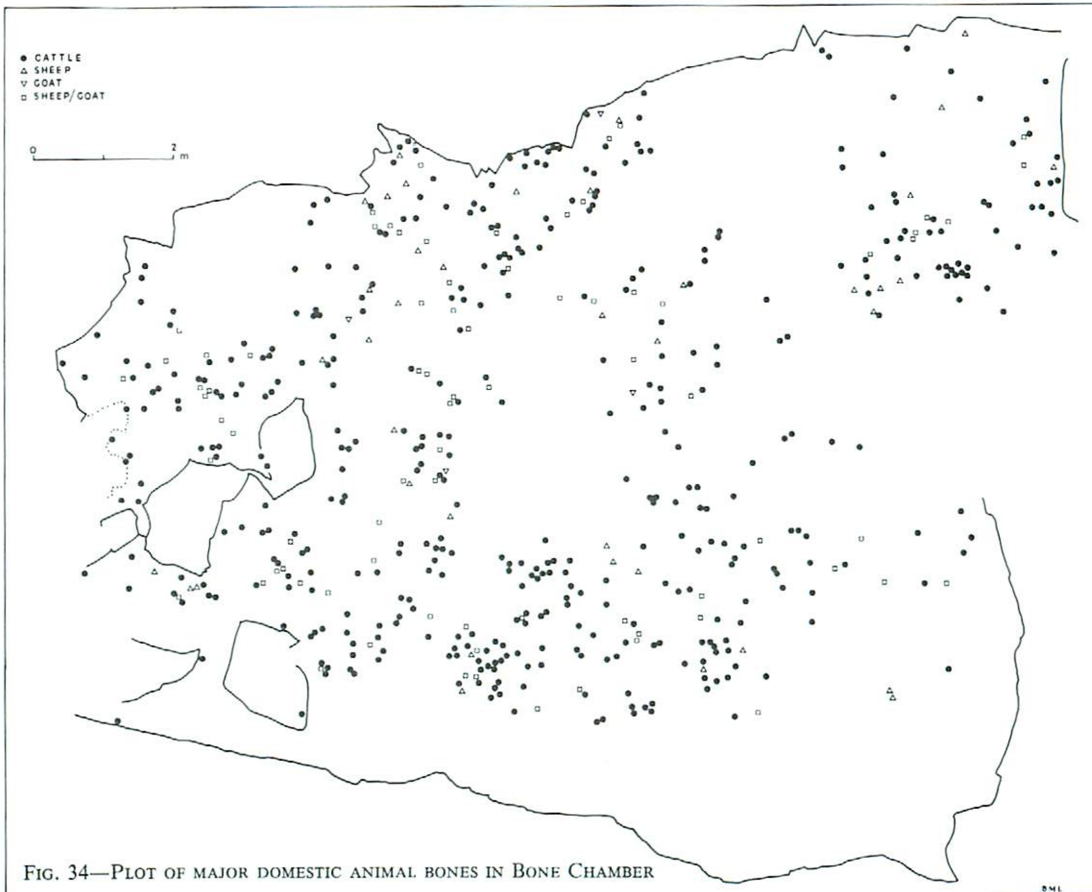

FIG. 34—PLOT OF MAJOR DOMESTIC ANIMAL BONES IN BONE CHAMBER

FIG. 35—PLOT OF MINOR DOMESTIC ANIMAL BONES IN BONE CHAMBER

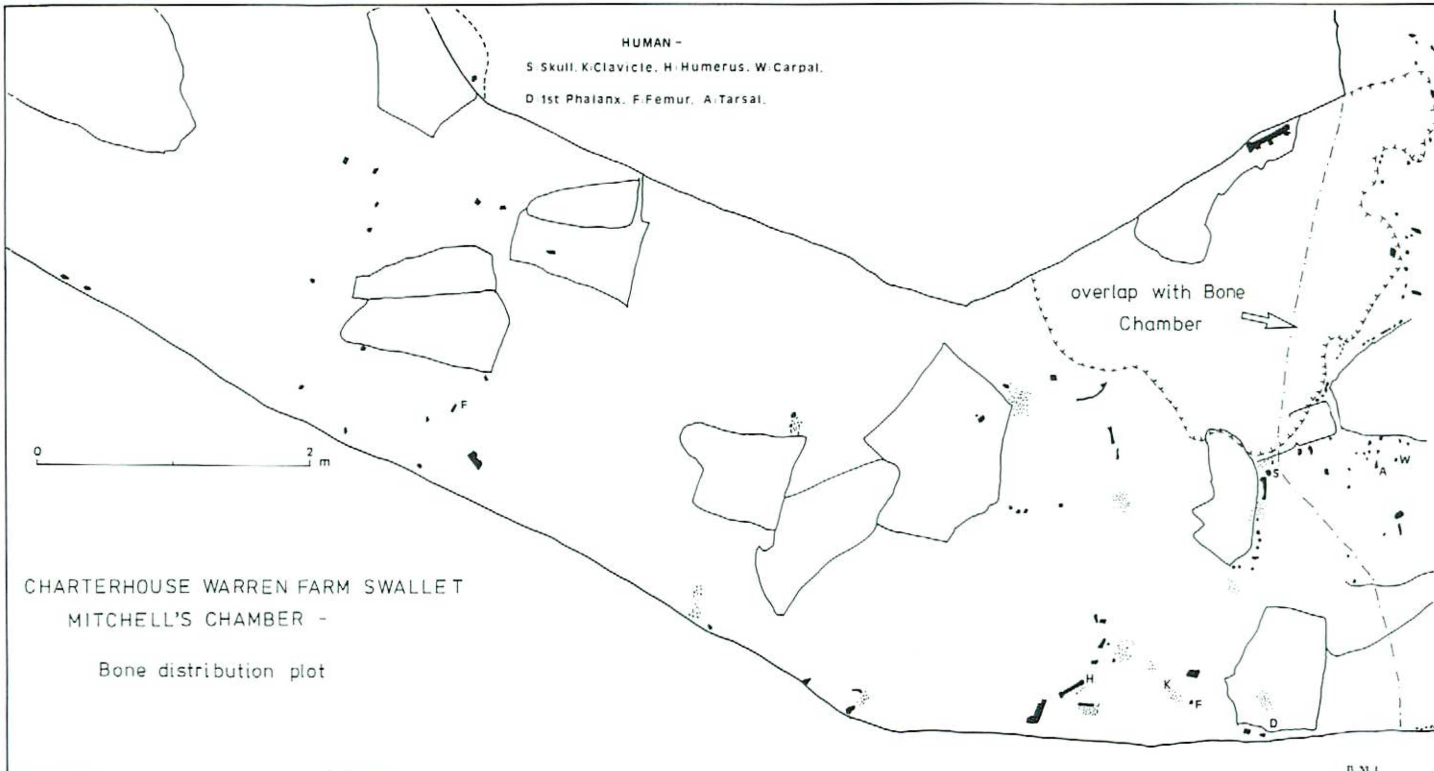

FIG. 36—PLOT OF BONES IN MITCHELL'S CHAMBER, WITH HUMAN BONES LABELLED

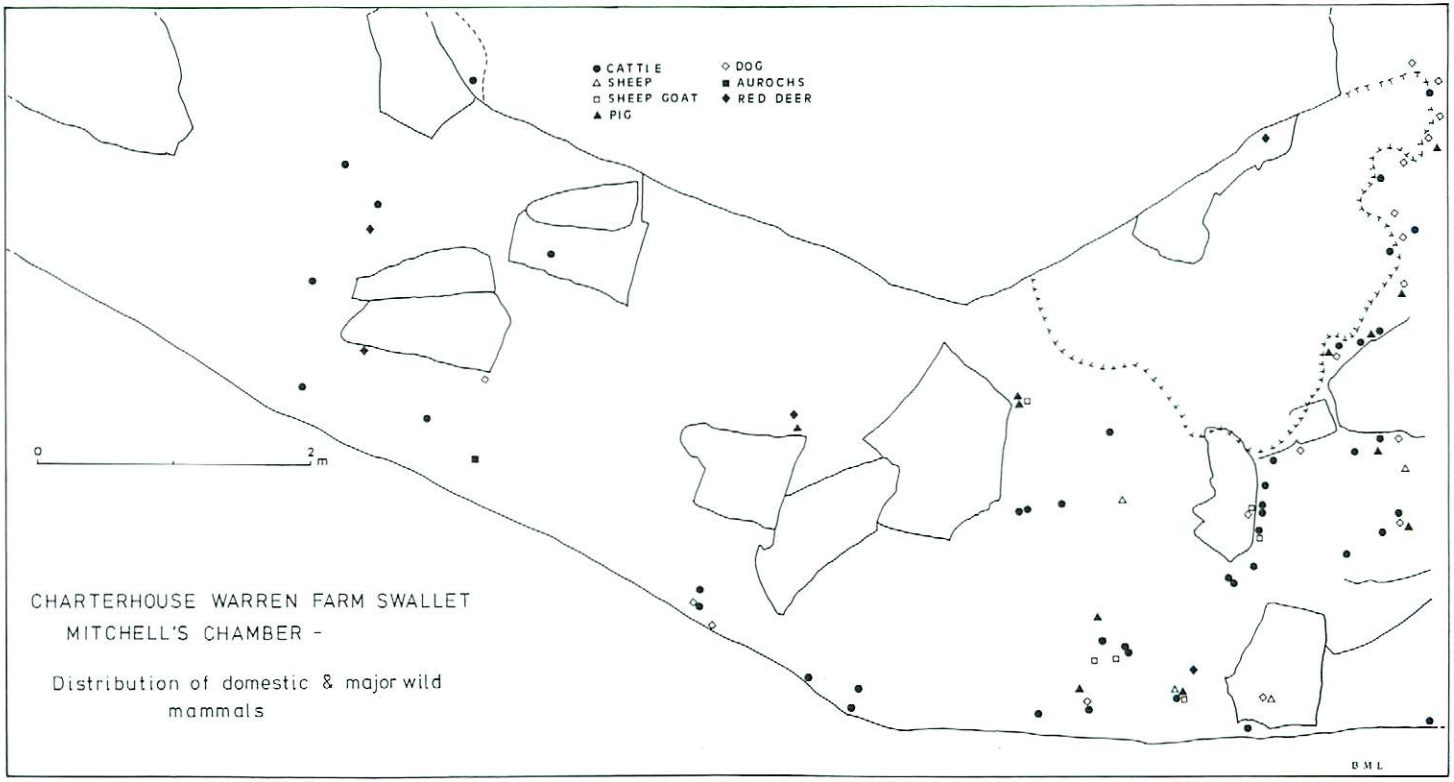

FIG. 37—PLOT OF MAJOR DOMESTIC AND WILD ANIMAL BONES IN MITCHELL'S CHAMBER

Small mammals, birds and frogs are apparently absent from Horizon 3 and Debris Cone 1. There is the skull of a weasel from Horizon 4, plus a small number of vole/mouse bones. Horizon 2 also has vole/mouse bones as well as shrew. Species present include common shrew, field vole (25 bones), and cf wood mouse (1 bone). The bird bones have not yet been fully identified, but include two redwing and two cf finch bones (Horizon 2). All the bird bones are from small species, the redwing being the largest represented.

Group 2: Debris Cone 2 debris flows

It is not possible to ascertain whether some of the group 2 animals arrived in the cave as complete skeletons (either as burials, as might be the case for the human remains, or as accidental pit-fall deaths for the other animals), because the bones are now in a secondary context. It might be possible to reunite bones from single individuals with careful analysis and measurement, but the present record is not detailed enough to attempt this with precision (and such an attempt would necessitate removal of the bones from the chambers). Nevertheless, some hint of possible associations can be obtained from simple bone distribution plots of individual species.

The distribution plots (FIGS. 30 and 36) show that the northern end of Mitchell's Chamber does not contain any bone, and the relatively diffuse bone distribution in the centre of Mitchell's Chamber becomes more concentrated down slope and into Bone Chamber. The part of Mitchell's Chamber that lies to the north-west of the area illustrated in FIG. 36 contains no bones at all except one group of bat bones which are presumably unrelated to the main bone deposits (see FIG. 30). This distribution is in complete accordance with the sediment analysis (pp. 194–195), i.e. the bones came in from the Main Aven. Although the bones are generally highly fragmented, the majority being unidentified for this reason, many large bones at the southern extremity of Bone Chamber are intact. It is hard to imagine how they could get there in this condition had they tumbled down from Mitchell's Chamber. Furthermore, the fragmentation patterns do not conform to the percussive breakage that would follow this kind of emplacement. The interpretation, by Dr Smart, that debris flows are the means by which the bones were transported across Bone Chamber, is thus borne out by the evidence from the bones themselves.

Analysis of the bone distribution reveals that, in general, the bones are scattered apparently randomly across the Bone Chamber (FIGS. 29 and 31). 'Gaps' in the distribution are the result either of disturbances by cavers (i.e. in removing bones from the taped-off pathways and in minor excavations along the southern wall of the cave), or of steep-sided depressions where the bones have fallen to the bottom (i.e. at the northern end of the Bone Chamber). The slightly more diffuse distribution of bones along the ridge in the floor of Bone Chamber is possibly the result of thinner debris flows over this feature (p. 197).

Group 2.i: Human Bones (Fig. 38)

Against the background of 'randomness' seen in FIGS. 29, 30, 31 and 36 can be set the distribution of the human bones (FIGS. 32 and 36). The human sample is quite small (TABLE VI) but there does appear to be a bias in favour of the western part of the chamber, with 84% of the bones lying to the west of an approximate 'half-way' line running NE—SW across the chamber. Further subdivision into three or four groups is possible on a subjective basis. One such group lies in the far northern part of the cave, near the wolf bones. A second group is to the east of this, lying against the wall near a small alcove. The third group is more diffuse and might be taken to represent two groups: its main concentration is in the south-western part of the chamber, and there is a northern extension (fourth group?) which lies between the first and second.

If these are real groupings, one must immediately ask the question as to whether or not distinct individuals can be identified. Unfortunately the sample size is rather small, but the bone elements present within each group certainly may come from single individuals (FIGS. 32 and 36) (with the two exceptions of a femur and a pelvis from infants). One cannot go any further at this point because matching-up of bones would require their removal from the cave. TABLE VII lists the bones present.

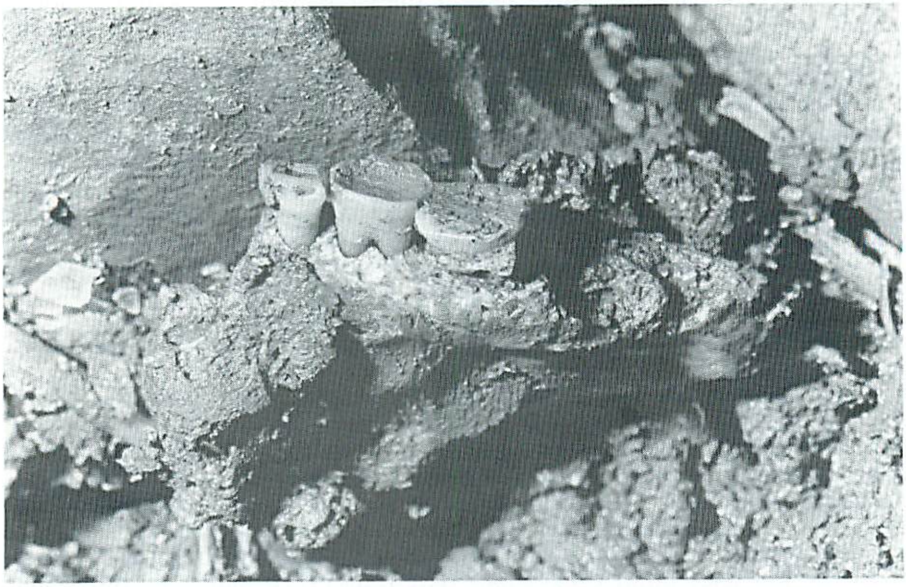

FIG. 38—HUMAN MANDIBLE (BC.DF-471) IN BONE CHAMBER DEBRIS FLOW DEPOSIT
Photograph: C. J. Howes

Group 2.ii: Animal Bones (Figs. 13, 16 and 18)

The distributions of the major (i.e. large) wild mammals (FIGS. 33 and 37) and of the domestic animals (FIGS. 34, 35 and 37) may be compared with those of the human bones (FIGS. 32 and 36) and the overall plot (FIG. 31).

Both wolf and aurochs samples are very small, but it is notable that the aurochs are found distributed right across the cave in an apparently random fashion (though mostly in the the southern part), whereas the three wolf bones are all close together and possibly represent a single individual (FIG. 33). The remainder might be located in the voids beneath the wall of the cave, one of which is entered via a steep-sided depression adjacent to the wolf bones. The large concentration of dog bones close to the wolf (compare FIGS. 33 and 35) leads one to question whether the identifications are correct. The same problems of identifying dog/wolf exist as those with aurochs/cattle (see above). The wolf bones were so designated on the basis of unusually large size. Many of the 'dog' bones are too fragmented for this form of separation. In any case the identification as wolf or dog must be considered as tentative.

An interesting contrast occurs in the distributions of the domestic species. Sheep/goat appear to be fairly evenly spread across Bone Chamber. There are c. 60 sheep/goat bones in the northern part of Bone Chamber and c. 50 in the southern part (FIG. 34). The same is true of cattle also, though with a slightly higher concentration in the southern half: the ratios are c. 150:200 (FIG. 34). Thus sheep/goat are about 24% of the sheep/goat and cattle total. In Debris Cone 1 there are fifteen sheep/goat bones and 48 cattle, providing a nearly identical proportion of sheep/goat. There is, however, a reasonably clear separation between the bones in Debris Cone 1 and the rest of Bone Chamber. Such a separation does not seem to occur with the pig/dog distribution (FIG. 35). Pig bones, however, appear to be more concentrated in the northern half of Bone Chamber: c. 70 compared with c. 40 to the south (FIG. 35). The dog bones have a similar pattern of about 100 north and 60 south. The dog/pig ratio, therefore, is about 60% dog. Debris Cone 1, in complete contrast, has three dog bones and 30 pig, i.e. 9% dog.

The above results indicate that there are two distinct deposits: Debris Cone 1 and the debris flow material from Debris Cone 2. In support of this is the tenuous evidence (on the basis of two bones) that roe deer is present only in Debris Cone 1 (FIG. 33), while goat (six bones) is found only in the debris flows material within the cave (there are goat bones in the Entrance Shaft deposits, TABLE V). It also implies that there may be differences within the debris flow material. The sediment analysis has demonstrated that the debris flows probably took two main paths across Bone Chamber, having been bifurcated by the ridge which runs approximately east-west, and dividing into two sections (p. 197 and FIG. 14). Is it possible that the debris flows to the north contained different deposits to those of the south? The differences referred to above of pig and dog in the northern and southern parts of Bone Chamber support the hypothesis of different deposits. To this may be added the fact that the aurochs bones from the debris flows are only in the southern part of Bone Chamber. If the deposits are different, are they of different dates? In contrast, the evidence from cattle and sheep/goat implies that the northern and southern parts are the same deposit. These questions cannot be resolved until dating of some of the bones has been carried out.

The presence of butchery marks has been demonstrated for aurochs bones from the Entrance Shaft excavations (Everton, 1975), and is an important consideration for interpretation of the material. Two or three specimens appear to have been battered, but no definite butchery was observed; however, since the bones were not cleaned and the lighting conditions were not ideal, it cannot be categorically stated that the bones had not suffered butchery. A small number of bones that have been removed from those areas of the Bone Chamber where disturbance seemed likely to occur have been cleaned, but no evidence for butchery was found.

The proportions of species are typical of a domestic archaeological assemblage (TABLE VI). The bones from Mitchell's Chamber have been listed separately, though they are undoubtedly part of the same deposit. This is borne out by the similarity of the percentages for Bone and Mitchell's Chambers. Cattle are predominant (46%), followed by dog (19%) and then sheep/goat and pig in roughly equal proportions (15% and 14% respectively). The human bones make up only 3% of the bones, compared with 36% for the identified major mammals (this figure being much higher if the unidentified cattle- and sheep- size fragments are also included).

The anatomical composition of the major species may provide further clues about the nature of the deposit. The body part analysis has been calculated using an anatomical indexing system (Levitan, forthcoming), and the anatomical elements have been combined into groups based on their meat bearing characteristics (see O'Connor, 1984) (Fig. 39). In very general terms, sheep and cattle can be said to have similar patterns of representation, with pig bones forming a second pattern. The latter is characterized by high proportions of upper limbs (particularly fore-limb) and cranial elements. In contrast, sheep and cattle have high proportions of upper hind-limb and metapodials. Neither result, however, is suggestive of a particular pattern of exploitation, the implication being that the deposits are fairly mixed. The superficial resemblance of the sheep and cattle results need not imply similar exploitation since the butchery of these species involves different techniques, and, in fact, sheep should be closer to pig in this respect. All three species present patterns which would not result from purely random anatomical selection, but the precise details of selection cannot be identified from this evidence alone.

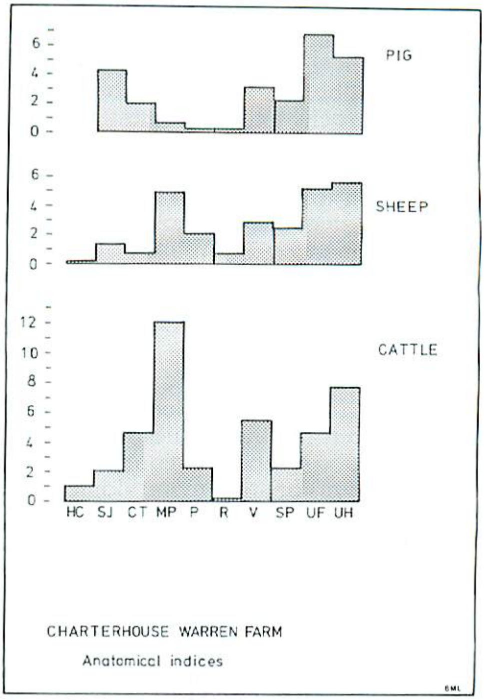

Fig. 39—Anatomical representation of major mammals from Debris Cone 2
HC: horncore SJ: skull/jaw CT: carpals/tarsals MP: metapodials P: phalanges R: ribs V: vertebrae SP: scapula/pelvis UF: upper forelimb UH: upper hindlimb

Discussion

Two major deposits of bones have been identified. That from the Entrance Shaft is characterized by a higher proportion of human bone than that from the debris flows (Tables V and VI), and the human bone from the Entrance Shaft may also be separated from the debris flows on the basis of the cut-mark evidence (Fig. 20), though it should be noted that the human bone in the cave may also have cut-marks, obscured by the dirt and poor lighting conditions. The bones from Debris Cone 1 have a very low proportion of human bone, but this is not unlike Horizons 1 and 3 of the Entrance Shaft fill. A further item of distinction is in the percentages of the major domesticated species. The lower levels of the Entrance Shaft (Horizon 4 and Debris Cone 1) are characterized by relatively high percentages of pig (over 27%) whereas the debris flow deposits have less than 14% pig (Tables V and VI). Besides showing this further distinction in the deposits, this result lends credence to the hypothesis that the bones found on Debris Cone 1 belong to the Entrance Shaft rather than the debris flows deposits, and supports the sediment analysis hypothesis of Smart (p. 194). To confuse the issue, however, it has been shown above that the debris flow deposits do have a higher concentration of pig in the eastern part of the cave (which includes Debris Cone 1), so the higher percentage of pig in Debris Cone 1 may be explained in this way. The situation is obviously very complex and will not be resolved without the aid of dating.

Other than this one certain and one possible distinction, the two groups of bone are very similar. The range of species and general order of frequency of species is similar. Wild animals are rare in both deposits, but a notable inclusion in both is aurochs (FIGS. 16 and 18). On the basis of the occurrence both of aurochs and of domestic species in both groups, the deposits must date to Neolithic and/or Bronze Age times. This, of course, assumes that the domestic and wild elements within each group are contemporary. There is no reason to believe this is not the case for the Entrance Shaft fill, but the debris flow deposits are more problematical. It is still possible, however, for there to be a gap of thousands of years between the two deposits, and indeed between the earliest (Debris Cone 1) and latest (Horizon 1) part of the Entrance Shaft prehistoric fill. It is not possible, therefore, to be more precise than these broad temporal limits, or the general statement concerning the essential similarity of the deposits.

Setting these problems aside, if the bones are considered to be a single assemblage (i.e. broadly Neolithic) then it is possible to make some interpretations concerning the nature of the assemblage.

Three aspects—species represented, proportions of species, and anatomical representation of the main domesticates—combine to give a picture of a fairly typical prehistoric archaeological deposit, i.e. predominance of domesticates with mixed anatomical representation. Two aspects that are fairly typical of Neolithic/Beaker assemblages are high proportions of cattle and pig. Grigson (1982) discusses several sites, and those with patterns most similar to Charterhouse Warren Farm Swallet are Robin Hood's Ball, Wiltshire (Early Neolithic); Knap Hill, Wiltshire (Early Neolithic); Windmill Hill, Wiltshire (Early and Late Neolithic); Poors Heath, Suffolk (Late Neolithic/Beaker); and Hockwold-cum-Wilton, Norfolk (Beaker). In the Late Neolithic proper there is a predominance of pig over cattle and sheep/goat, so the Charterhouse Warren Farm Swallet assemblage appears to fit into either an Early Neolithic or Beaker pattern.

The implication of this pattern is that a fair amount of woodland may have been present for pannage of the pigs, but that clearances were available for grazing sheep. Cattle are thought to be grazing animals, but they are natural browsers, so would be quite at home in open woodland. A woodland habitat is also to be expected for aurochs, wolf and deer. One may speculate, therefore, that the Mendip farmers relied mainly on cattle and pigs, sheep being relatively unimportant for meat (equal proportions of sheep and pig in fact indicate that pig would supply at least twice as much meat).

The anatomical data indicate mixed deposits, thus representing all stages of butchery from slaughter through to consumption waste. If it is assumed that the cave holds a representative collection, then this indicates that the animals were being slaughtered and processed in the locality.

The importance of the bones can be summarized under four headings: (a) evidence concerning the extinction of aurochs; (b) evidence of prehistoric cut marks on human bones; (c) the nature of the non-human bone assemblage; (d) taphonomic study of bone emplacement and redeposition.

The first point has been discussed elsewhere (Grigson, 1981), and the importance of this site has been noted in this respect.

The second point gives the site another unique element as there is no evidence known to the author for such deposits from Beaker age sites, though there are parallels from the Neolithic (see below). One may speculate about the purpose of these deposits, and possibly the ritual burial element, with Beaker accompaniment, is the most likely explanation, but there is little hard evidence for the reason(s) for this activity. This point is taken up again in the next section.

Thirdly, although the patterns of exploitation are not unusual for Early Neolithic or for Beaker sites, this assemblage is an important addition to the regional evidence as there is very little bone information from the Mendips. The importance of cattle and pigs, together with the presence of aurochs, wolf and deer, suggest the exploitation of open woodland, whilst the presence of sheep indicates open grazing was also available. Thus although woodland cover was still, perhaps, extensive, there is evidence for clearances for grazing.

The taphonomic aspect of the assemblage has been provided with the most complete solution, largely as a result of the sediment analysis, as well as the analysis of the bone distributions. It is clear that the bones in the Entrance Shaft are *in situ* primary deposits, though the status of the bones in Debris Cone 1 is less certain. The rest of the bones in Bone and Mitchell's Chambers accumulated initially at the top of the boulder slope in Mitchell's Chamber, and were carried down into Bone Chamber by a series of debris flows. The sediment matrix of these flows has since been sapped out through the floor of Bone Chamber to be redeposited at lower levels, leaving the bones stranded on the floor of Bone and Mitchell's Chambers.

SITE ENVIRONMENT

B. M. Levitan

The later part of the Neolithic and the Early Bronze Age periods are characterized by clearances of growing woodland in many parts of the country. Smith (1981, pp. 149–150) points out that man's role in destruction of forest and initiation of peat growth is one of tipping the balance towards change under conditions of stress that already apply. The evidence from the Mendip region is very limited, so this site is an important addition. The best environmental evidence from the region is from the Somerset Levels. Garvin's Track, the Walton Heath Track and Rowland's Track are three trackways in the Somerset Levels that date from around 3000 BC, and Hibbert's study of the pollen from these sites shows that the woodland clearances were quite localized, being concentrated near the Polden Hills and the Burtle 'island' (Coles *et al.*, 1973, fig. 6). The main trees which were used in trackway construction were the very species that would have grown on the dry ground represented by these locations. Rackham's (1977) study of the woodland management from the same sites shows that areas of land were certainly set aside for the deliberate production of underwood, though he does not feel this evidence represents the beginning of woodland management in Britain (*op. cit.*, 71).

The general role of man in forest clearance is seen as having greater impact as time goes on, and for the Bronze Age, Tinsley (1981, p. 247) suggests that 'man's activities seem more likely to have been the initiating factor in woodland decline' than climatic factors, summarizing the information in a table which shows the intensification of forest clearance through the Bronze Age (*op. cit.*, table 5.8). The evidence from the Somerset Levels shows a number of trackways built during the Bronze Age, the earliest being the Abbot's Way track which dates from about 2500 BC. This was built on the raised bog that was developing from about 3000 BC onwards. At the time of the Abbot's Way track there is a period of forest regeneration on the dry land surrounding the raised bog (Hibbert, 1978, p. 94), and a renewed phase of forest clearance does not occur until later on in the Bronze Age.

The paper by Chappell (1976) relates mainly to the environmental aspect of the site. He draws attention to the possibility that the swallet was taking water at the time, using the presence of amphibians and water vole as supporting evidence. The water vole was probably less aquatic in the past than it is today, and it is certainly less aquatic on the continent (Corbet and Southern, 1977, pp. 199–200), so this species does not provide firm evidence for the presence of water. The amphibian remains which include all ages of individual represented imply a death assemblage, and thus the proximity of water is more strongly indicated. As Chappell rightly points out, although adult frogs and toads may be expected to turn up away from water, juveniles are much less likely to travel as far. Water supply need not have been constant thoughout the year: ponding may simply have occurred in the bottom of the shaft from local seasonal runoff, allowing the shaft to become a moist micro-habitat 'refugia'.

The birds, mammals and amphibians do not provide a very clear picture of the environment, but the molluscan remains (Chappell, 1976) indicate that shady, damp conditions prevailed. Chappell interprets this as indicating the presence of woodland, citing the arboreal habits of *Balea perversa* in particular. Kerney and Cameron note that *Balea perversa* is characteristic of dry stone walls and rocks, and is less common in trees (Kerney and Cameron, 1979, pp. 172–173). Of the other species, the only one that is conceivably an indicator of damp *woodland* as opposed to damp *places* is *Punctum pygmaeum* (Kerney and Cameron, 1979, p. 101), but even this species may be found in open and dry habitats, and also especially in ditch fills, etc. (Evans, 1972, pp. 195–196). This habitat could well be seen as of a similar type to a ditch fill. Although this mollusc assemblage would be quite at home in damp woodland, it would also be expected in just such a habitat as the swallet itself would have offered—shaded, calcareous and damp. There is no need, therefore, to see the immediate setting as particularly wooded on the basis of this evidence alone.

Some evidence for the proximity of woodland may be adduced on the basis of the presence of aurochs and red deer in the deposits, as well as of pigs. The correlation of the latter species with woodland pannage has been discussed by Grigson (1982), who notes (p. 301) that 'it was not until the late eighteenth century agricultural improvements of Arthur Young, Bakewell and others that pig keeping became quite independent of woodland'. The major importance of aurochs at this site is the late date of its occurrence. Grigson (1981, p. 219) attributes the extinction of aurochs to over-exploitation by man, and surely a decrease in woodland habitat may be added to this. Bradley (1978) suggests a change-over from intensive to extensive land-use and a more diverse economy with an increase in woodland exploitation towards the end of the Neolithic. The large number of Neolithic and Bronze Age sites in the region (FIG. 28) attest to a fairly high level of exploitation, so surely the Mendips may be included in this changing pattern.

The Mendips at this time, therefore, may still have had significant tracts of woodland—better indicated by the presence of deer and aurochs and the exploitation of cattle and pigs, than by molluscan evidence—but we can, perhaps, see the beginnings of a change in the environment highlighted by the exploitation of sheep/goat and the decreasing in numbers of aurochs, leading to its eventual extinction, possibily in the Middle Bronze Age in this region. This would appear to fit reasonably well with the general picture given at the beginning of this section, with Neolithic forest clearances possibly being quite small, but later in the Bronze Age the clearances becoming more significant.

THE ARCHAEOLOGICAL IMPORTANCE OF THE SITE IN A REGIONAL CONTEXT

B. M. Levitan, J. S. Thomas and C. J. Hawkes

Introduction

The material recovered from the Entrance Shaft excavations relates most directly to the cultural aspect of the site, and some of this ground has been covered in the artefact report (p. 202 ff.). The relevance of the material from within the cave is less clear, though there is an obvious cultural element insofar as there are human and domestic animal remains present. The cultural evidence may be discussed at two levels: the intrinsic and the regional. In the former case the hope is to provide a reconstruction of the activities represented, and in the latter the aim is to compare the site with others in the region.

Previous Interpretation of the Site

In his article on the environment of the site, Chappell (1976) mentions the human remains associated with the Beaker, as well as the Beaker and the flint tools. He briefly describes the human bones, mentioning the cut-marks and the mixing and disarticulation. He also notes the weathering and rodent gnawing on some of the bones, and concludes that the bodies had been decomposed and deliberately dismembered before being placed in the shaft. He does not attempt an interpretation of this practice beyond speculating that 'bone was an important economic material and that the rift was the local source, hence disturbance could be secondary' (Chappell, 1976, p. 59). This seems a rather unlikely interpretation, and it is far more probable that the 'disturbance' was the result both of dismemberment before burial and later disturbance as further burials were added, rather in the way that similar activities have been postulated in burial monuments such as Neolithic chambered tombs.

Chronological Background

Burgess (1974, p. 168) divides the British Bronze Age into four periods, the earliest of which is the Beaker phase, roughly dated to 2100–1650 BC. However, it is perhaps best to envisage a degree of chronological overlap between formal periods like the later Neolithic, Beaker, Early and Middle Bronze Age. Each is defined on the basis of the currency of particular artefacts, whose use often coincides with that of items attributed to other cultural horizons. Our problem in considering the cultural material from Charterhouse Warren Farm Swallet is thus one of whether particular artefacts could or could not have been deposited at the same time. Hence, whilst some artefacts are clearly of Beaker date and others are formally later Neolithic, the significance of the contemporaneity of such sites is precisely the issue which has been addressed in several recent publications (e.g. Bradley, 1984; Thorpe and Richards, 1984), and provides no real difficulty. By contrast, more serious problems are raised by the attribution of items to different stages *within* the Beaker sequence. The dated aurochs bone from Horizon 1 (p. 200) clearly escapes these considerations by fitting into Burgess's Middle Bronze Age, so that the material from Horizons 2–4 and Debris Cone 1 may be from any period between about 1650 and 2500 BC. Horizon 2 may conceivably represent the later part of this range (i.e. about 1650 BC) and Debris Cone 1 may be earlier than 2500 BC (i.e. Neolithic). The time scale for the emplacement of the prehistoric layers, therefore, could extend through much of the Neolithic and Bronze Age periods, potentially more than 2000 calendar years.

The exact origins and chronology of the users of Beakers is still a matter of controversy, as is pointed out above by Thomas (p. 207). These difficulties are compounded by the serious problems of identifying Beaker domestic activity—a point which is underlined by the diversity of sites which were considered by Gibson (1982) under this rubric. Throughout the Neolithic and earlier Bronze Age in Britain, one of the major obstacles to interpretation must clearly be the paucity of settlement evidence. In the specific case of the Beaker phase in Mendip, it must be seriously questioned whether, for instance, the mass of pottery, flintwork and animal bone deposited in the ditches of the henge at Gorsey Bigbury (ApSimon *et al.*, 1976) can be claimed to be representative of contemporary domestic activity. Where such a deposit is found on a pre-existing ceremonial site, in association with burials, it cannot easily be classified as settlement residue. Similar caution must be registered over the material from Bos Swallet (see below, p. 232). Only with the later part of the Bronze Age is demonstrably domestic activity recognized in locations within a reasonable distance of Charterhouse Warren Farm Swallet, as in the cases of the recently excavated sites of Brean Down (Bell, 1986) and Potterne (Gingell and Lawson, 1985).

Having recognized the paucity of contemporary settlement evidence, it is nonetheless important to point out that Beaker pottery appears to have played a part in a specialized set of activities relating principally to Beakers and monuments (Bradley, 1984, p. 72). Until the latter part of the period of use, beakers tend to be scarce from settlement sites of any kind. Only when they were replaced in the burial context by Food Vessels and Collared Urns are Beakers relegated to the domestic sphere. Thus a Developed Northern Beaker of Lanting and van der Waals' Step 3 or 4 fits better into a context of deliberate deposition than one of chance loss, although the problems of the relatively later flints must be borne in mind.

Regional Background

Both Avon and Somerset have had the benefit of the publication of recent prehistoric surveys, and many of the sites shown in FIG. 28 have been gleaned from these sources (Aston and Burrow, 1982; Aston and Iles, 1987), though there are some additions (e.g. Brean Down settlement site, Bell, 1986) and various omissions. In particular the large number of single finds have not been plotted (e.g. Grinsell, 1985) since they seem of little real relevance and would serve only to clutter the map. The other major source of information is the invaluable survey by Grinsell (1972) of Somerset barrows. The main impact of FIG. 28 is the large number of sites in the region, particularly in the Mendips where the concentration is notable. The 'blank' areas of the

Somerset (Clay) Levels and Moors may well be unrepresentative as witnessed by the wealth of finds from the Somerset Levels Project in the Somerset Moors (*Somerset Levels Papers*), and the potential of sites beneath the relatively recent alluvial deposits of the Levels proper (McDonnell, 1979; Leech, 1977).

The site at Charterhouse Warren Farm Swallet, therefore, fits into a regional picture which is indicative of a high level of activity in the region, and one where ritual activities are of some significance, there being settlement sites (e.g. Brean Down, Chew Park) (Bell, 1986; Darvill, 1987; Grinsell, 1987), burial sites (e.g. the many barrows in FIG. 28) and possible ritual sites such as Gorsey Bigbury henge (ApSimon *et al.*, 1976). It is difficult to find exact parallels for Charterhouse Warren Farm Swallet, but there are common elements at other sites in the region, e.g. Beaker and 'sponge finger' finds quoted by Thomas (pp. 207–209). The unique aspect of the site is the *combination* of the material: the artefacts, human bones with cut-marks, cave site, etc.

Discussion and Interpretation

The major problem in interpreting the shaft sequence is the dating of the horizons. When the radiocarbon dates become available, it is hoped that this will be cleared up. In the meantime, the most difficult aspects to deal with are: (a) the method(s) of emplacement of the fill, and (b) the possible 'inversion' represented by the flint/'sponge finger stone' horizon (Horizon 4) and the Beaker horizon (Horizon 2). The first point is briefly discussed in the section on the shaft stratigraphy (p. 199 ff.), and the second is considered in the report on the artefacts (p. 208).

Methods of Emplacement

There are basically three possibilities, all of which may have operated at different times.

Firstly there is accidental emplacement by erosion or weathering of another deposit: for example, periodic flooding of the dry valley may have carried material into the Entrance Shaft. Such a case would undoubtedly lead to abrasion of any bones or artefacts, and since no damage of this kind was noted, this possibility would appear not to have operated for the archaeological horizons.

Secondly, there is accidental emplacement where the shaft acted as a 'pit-fall' trap. In this case only the animal remains are relevant. Emplacement by this method would result in entire, articulated skeletons of vertebrate animals. The method of excavation was not sufficiently precise to record small mammals (the size of hedgehogs and smaller), but remains of large mammals were well enough recorded to show whether whole, articulated skeletons were present. Some articulated bones were noted (e.g. FIG. 9), but there were no whole skeletons. The juvenile cattle in Horizon 3 were hurriedly excavated, and not so well recorded as the bones in Horizons 2 and 4, and it possible that these are pit-fall trap casualties. None of the other bone deposits in the Entrance Shaft, however, appear to have been introduced in this way.

Thirdly, there is deliberate emplacement. Here, the main agency would be human (for the artefacts and domestic mammals), though another agency could be predators/scavengers. The latter would result in chewed bones, and very few of the bones appeared to have been chewed, so this source was probably not significant. Deliberate placement of material by man could be the use of the shaft as a rubbish tip and/or placement of material in order to bury or hide it. In the case of rubbish deposits, one would expect the material to have been simply thrown in from the top of the shaft. Bones and artefacts which had been thrown in to fall fifteen (Horizon 2) or twenty (Horizon 4) metres would have sustained considerable damage. Although the Beaker was broken, the scatter of fragments was over too small an area for this idea to be tenable. The artefacts in Horizon 4, similarly, bore no evidence of the kind of damage they should have sustained had they been thrown in. The same is generally true of the bones in Horizons 2 and 4, and also of the bones in Debris Cone 1 within Bone Chamber.

This leaves the possibility of deliberate burial or hiding of 'treasure'. The artefacts are more easily explained in this context as it seems obvious they were carefully placed in the shaft, a feat which would have required a considerable climb, probably using ropes. The association of human bones with the artefacts in both horizons seems too much of a coincidence to suggest they are different deposits from the artefacts. It is easy to imagine that the open Entrance Shaft of the swallet must have had a real importance to the people, and the deposition of the fine array of artefacts described above is witness to this. The human burials of infants in Horizon 4 and dismembered bones (some with cut-marks) of adults in Horizon 2 are also testimony of this.

The Beaker site of Bos Swallet which lies within five kilometres of Charterhouse Warren Farm has an important assemblage of Beaker remains (Taylor and ApSimon, 1964). Superficially, the site resembles the Entrance Shaft deposits, having a 'swallet' shaft fill containing Beaker sherds and flints. Taylor points out that if the site actually was a swallet, it cannot have been active for very long and hardly warrants the term. It produced sherds from more than 20 Beakers as well as over 40 flint implements. Although the material was found in a 'swallet' shaft, it was very obviously dumped in the shaft and the vessels were incomplete, having originated elsewhere. Furthermore, there were no human bones noted. Thus, other than the presence of Beakers and flints within a shaft, it is unlike Charterhouse Warren Farm Swallet.

The most completely known burials in the region are those from the cists at Corston (Taylor, 1933; Crook and Crook, 1944). It is, perhaps, significant that cist 1 contained a 'sponge finger stone' similar to those described above (p. 205), several flint tools and a Beaker not very dissimilar to that from Charterhouse Warren Farm Swallet. Bradley (1984, p. 84) notes that Bronze Age inhumations are more common than cremations, and that often both occur together. Most known Beaker burials are from barrows, and are single inhumations, but there are variations on this theme (Burgess, 1974, p. 174), cist graves, such as Corston, being one example. Thus the inhumations with cut-marks are of major importance as there are no parallels from Beaker Age sites. Does this represent a unique local ritual, or does it indicate that other similar sites must exist? There are possible parallels for this type of practice from the Neolithic, for example the burning of flesh from the bones in order to disarticulate them (some of the Charterhouse Warren Farm Swallet bones are burnt) noted by Thorpe (1984, p. 49). Thorpe and Richards (1984, p. 75) mention a spread of disarticulated human remains associated with Beaker sherds and flints from Callis Wold 275 Barrow (Humberside).

There are better parallels for disarticulation of human bones in the Neolithic, and this may have been in order to move the bones from one locality to another, a possibility which has been discussed by Ashbee (1970), Mercer (1980), Piggott (1954) and Thorpe (1984), among others. Mercer describes Hambledon Hill, Dorset as a possible cemetery where 'it seems likely that very large quantities indeed of human cadaveric and skeletal material must have been present within the enclosure in a disordered state.' (Mercer, 1980, p. 63). He also describes the practice of 'the placement of carefully selected groups of objects in pits that were promptly backfilled' (*ibid.,* p. 63), a situation that seems quite similar to Charterhouse Warren Farm Swallet. Piggott quotes several examples, such as the remains from the earthen long barrows at Tilshead and Norton Bavant: 'in both instances the phenomena present could only be explained by assuming the individuals to have been in a skeletal condition at the time of the building of the barrow' (Piggott, 1954, p. 57). At Boles Barrow, Wiltshire, he cites Thurnam's discovery of a human skull and neck vertebra (presumably the atlas) where the vertebra had been cut in half indicating decapitation (*ibid.,* p. 57). Evidence for exposure before burial also comes from chambered tombs such as Giant's Hills Long Barrow, Lincolnshire, where a human skull contained egg case remains from a helicoid snail which lays only in the open, and never underground (*ibid.,* p. 106). Piggott and Atkinson in Gowlett, *et al.* (1986, p. 144) discussed the idea of bone circulation at West Kennet Long Barrow, Wiltshire, a late Neolithic/Beaker site. They suggested that bones from other sites were being brought to West Kennet for inclusion in the secondary chamber fillings. Bearing in mind the comments of Bradley concerning the variable survival of different practices in different regions (Bradley, 1984, pp. 79–80), does this represent the local survival of an earlier tradition? This would fit well with the suggestion (above, p. 209) that outside the 'core zones' of Beaker impact in Wessex and the Upper Thames Valley, the use of Beaker pottery in Southern Britain was often in the context of continuing local traditions and practices. This idea is succinctly summarized by Whittle (1985): 'the range of possible practices, from direct burial to excarnation and post-deposition removal, varies from site to site and area to area'.

Chronological problems

There is the conflict in dating evidence from the flint work and the Beaker (p. 207), and there is also the evidence from the non-human bones which indicates either Early Neolithic or Beaker for the cave assemblages. The sequence bears a fairly close resemblance to that of Gorsey Bigbury henge (ApSimon *et al.,* 1976) where a Neolithic ritual monument was succeeded by a possible domestic Beaker site (but see above, p. 230), the succession being marked by the 'closure' (i.e. desanctification) of the Neolithic rituals by the placement of Beakers and associated material (see also Clarke *et al.,* 1985, for similar practices). The burial practices at Charterhouse Warren Farm Swallet have parallels in Neolithic sites, as shown above, so it would appear that the infant burials, flintwork and associated artefacts of Horizon 4 are Neolithic. The archaeologically relatively sterile layers of Horizon 3 may be a deliberate infilling by Beaker folk as part of the 'closure' of the rituals, though there is no direct evidence for this other than the sherds of Grooved Ware which may come from this horizon. Horizon 2, with the human bones, including those with cut-marks, and Beaker is more easily seen as a 'closure' deposit.

This might also fit with some of the evidence from other Mendip sites (FIG. 28), e.g. human skulls at Bone Hole (Cox, 1976); human bones associated with Beaker and Grooved Ware at Cockles Wood (Hickling and Seaby, 1951); and the Beaker material at Chelm's Combe (Balch, 1927).

There is, however, no evidence of cut-marks similar to that on the Charterhouse Warren Farm Swallet material (which appears to be related to defleshing and disarticulation) on human bones from any of these sites, though this does not preclude this practice having occurred elsewhere. What is certain is that these Mendip caves are an unusual archaeological phenomenon.

If the interpretation of the above sequence is correct, then this site provides a rare insight into the practices of the Neolithic and Beaker periods. There is a change from the multiple burial and curation of cadaveric material (as on many Neolithic sites), represented here by deposits in Horizon 2, to the burial of single inhumations/cremations beneath round barrows so typical of the Bronze Age, many of which are shown in FIG. 28 (see also Grinsell, 1972). One also wonders if parallels might be drawn between the lower (?Neolithic) horizons of the Entrance Shaft sequence and the Neolithic ritual shaft of Wilsford Shaft, Wiltshire, shortly to be published.

The non-human bones, in contrast to the human bones, appear to reflect the domestic activities of the people. Radiocarbon dating of the assemblage is not yet available, and will be crucial in finalizing the interpretation of the assemblage. On the basis of comparisons with other assemblages the site may be either Early Neolithic or Beaker period (or both). Farming practices appear to have been a mixture of open grazing (some sheep, cattle) and open woodland pannage/browsing (pigs/cattle). Although it is not an unusual assemblage in a country-wide sense, it is an important local assemblage since there are few well recorded/published assemblages from the Mendips.

Some of the non-human bones in the Entrance Shaft may have resulted from animals falling in accidentally, or others being deliberately driven into the shaft as a method of hunting. This does not seem very likely, however, since few articulated remains were discovered (the only possible exception being the cattle bones in Horizon 3), and there does not appear to be the number of bones that might be expected if this were the case (even allowing for removal of some bones after dismemberment).

In conclusion, this site has provided important evidence for Neolithic/Beaker landscape, farming and ritual practices. This report has drawn attention to the fact that there are few published analyses of such material in the Mendips, yet this material undoubtedly exists, as hinted at by sites such as Bone Hole (Cox, 1976) and Gorsey Bigbury henge (ApSimon *et al.*, 1976). The phenomenon of using Mendip caves in unusual or even unique practices is highlighted by Charterhouse Warren Farm Swallet, and the region is long overdue for reappraisal and concentrated research.

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APPENDIX

A dog skeleton from Upper Bedding Chamber

B. M. Levitan

The Lower Cave contains very few bones larger than 1 cm in size. Some bones, such as a metatarsal of red deer which gives its name to Red Deer Passage, and a group of dog bones from the Lower Bedding Chamber extensions may represent bones which originated from the Upper Cave deposits. The many hundreds, and possibly thousands, of tiny bones found in the mud deposits on the floor of Upper Bedding Chamber (p. 185) are also likely to originate from the Upper Cave, and were washed down into their present location along with the sediment they occupy.

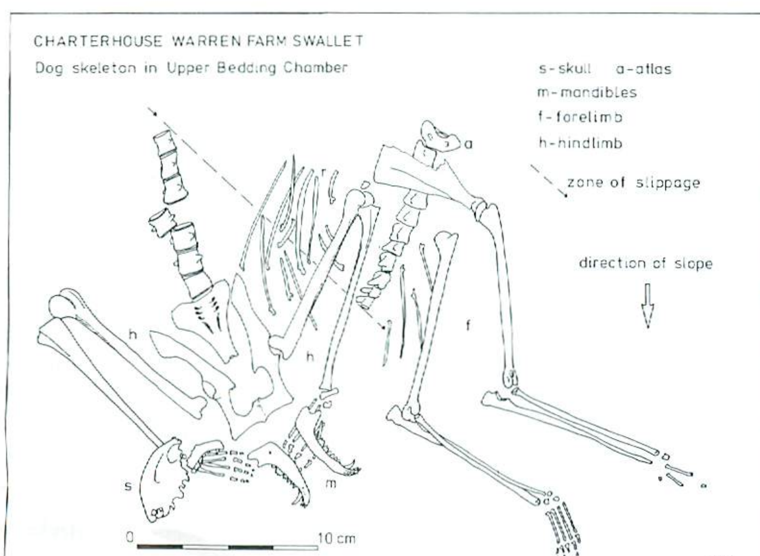

FIG. 40—PLAN OF DOG SKELETON IN UPPER BEDDING CHAMBER

The exception to these is an almost complete skeleton of a small dog found in Upper Bedding Chamber, close to Dead Dog Pitch (FIG. 10). The skeleton is in articulation for the most part, but slippage of the sediment base has resulted in displacement of the fore and hind parts of the skeleton, and presumably in displacement of the skull and mandibles which may have rolled to their present position (FIG. 40). Missing bones include right scapula, eight or nine thoracic vertebrae, some ribs, some left metacarpals and a number of phalanges. These may all have fallen into a deep crack in the bedding close to the down-dip end of the skeleton.

The dog was an adult, with all the long bone epiphyses fused and with permanent dentition. Forelimb dimensions (all approximate since vernier gauge callipers were not available for measuring the bones) represent a shoulder height of about 32 cm (standard deviation 3.0, coefficient of variation 10.5%), and hind limb measurements indicate a height of about 29 cm (standard deviation 0.8, coefficient of variation 2.4%), i.e. about the size of a spaniel or beagle. The cranium had partially collapsed, so it is not possible to define the cranial conformation. The general appearance, however, indicates a relatively short-snouted breed of dog.

It seems highly unlikely that this individual comes from the same deposits as those in the Upper Cave for three reasons. Firstly, the skeleton is in articulation, so the dog probably died at this spot: an articulated skeleton from the Upper Cave could not have been transported to the present location and have remained in articulation. This alone does not argue for a different date, since the dog may have fallen into the Upper Cave and made its way to its present location before dying at almost any date. Secondly, the dog is on the mud floor and not covered by the sediment, so the emplacement of the skeleton must post-date the emplacement of the sediment. The sediment analysis indicates that the removal of the sediment took place during and after the debris flow activity, so the dog must post-date this. Thirdly, there are no archaeological records of dogs of this size before the Iron Age (i.e. before about 800 BC). Dogs from the Bronze Age were generally larger than 40 cm, whereas in the Iron Age dogs as small as 30 cm were present, and by the Roman period true 'toy' dogs had been introduced (i.e. less than 25 cm) (Harcourt, 1974).

The actual date of this dog may be any time from the Iron Age onwards, but the (subjective) opinion of the author is that it is more modern, and may even date from the last few centuries. It is not difficult to imagine that a small dog such as this may have chased some animal (e.g. a rabbit) down a hole, and then fallen into the cave system at some point. It may then have wandered quite extensively through the system until it eventually died of starvation. Thus although it is not part of the main bone assemblage, it is nevertheless a notable illustration of bone taphonomy and emplacement deep within a cave system.

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