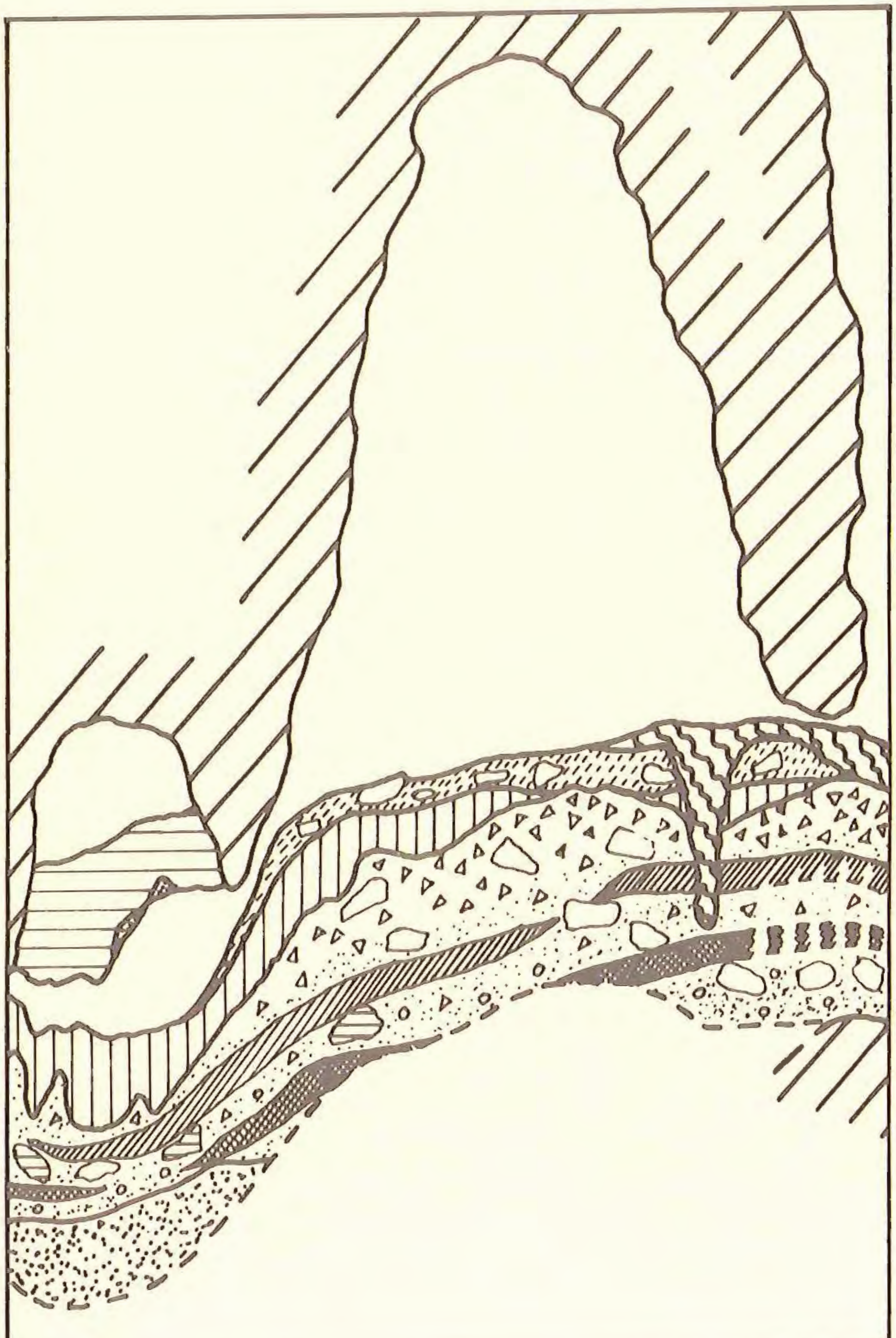
A New Analysis of
Kent's Cavern, Devonshire, England

by John B. Campbell and C. Garth Sampson



University of Oregon Anthropological Papers, No. 3, 1971

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C. Melvin Aikens

Editor

Printed by the University of Oregon Press

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Abstract

Kent's Cavern is best known as a crucial site in the 19th Century debate over the antiquity of Man. Excavations there by Father John MacEnery (1825-26 and 1829) suggested that human artifacts were to be found in direct association with the bones of extinct animals. This was confirmed by William Pengelly's extensive excavations (1865-80). The extraordinary quality of Pengelly's excavation methods and records has been largely ignored and the archaeological importance of the site has been overlooked except by local amateur diggers who left inadequate records. Detailed sections of the richest parts of the cavern system have been reconstructed from Pengelly's diary and the scattered museum collections have been reanalyzed in an attempt to isolate those specimens which definitely come from undisturbed deposits. Samples of the deposits have been analyzed and found to contain substantial fossil pollen at various levels. Pengelly's faunal analysis has been updated and evaluated for further research.

The site contains four archaeological horizons. (1) An Early Acheulian industry in hard breccia deposit associated with cave-bear bones (comprising 90% of the associated fauna) and at least three other species of Late Villafrancian or Cromerian date. This occurrence is the only one of an Early Acheulian in Europe which could predate the onset of the Mindel glaciation, and suggests that specialized butchering of hibernating bears during winter may have been practiced by the so-called "unspecialized" Acheulian hunters. (2) A Mousterian of Acheulian tradition in an overlying Loamy Cave Earth, associated with a more generalized Last Glacial fauna and flora. Possibly more than one Mousterian horizon is present and it is expected that further excavation in the deposit will provide the only available evidence for the chronology and internal evolution of the Mousterian complex in England. (3) An Early Upper Palaeolithic at the top of the Loamy Cave Earth, with Last Glacial fauna and pollen. This is in part typologically similar to the leaf-point industries of central and western Europe, but the sample is too small for reliable percentage values. (4) A "Creswellian" sample from a hearth complex in the Stony Cave Earth near the northeastern entrance to the cavern system. This is associated with a late Last Glacial fauna and flora. Further excavations, sampling and analysis of extant collections are anticipated, to confirm the importance of the site for present day Palaeolithic studies.

Introduction

Kent's Cavern is on the southern coast of Devonshire in Southwest England. It is situated on a small peninsula which forms the northern side of Tor Bay, and the cavern entrances are located within the eastern limits of the town of Torquay. The British National Grid reference for Kent's Cavern is SX 93456415 and the latitude-longitude coordinates are 50° 28' north by 3° 30' west. The cavern system is entered at two points on the lower, northern slope of Lincombe Hill overlooking the small dry Ilsham Valley. The entrances are about 50 feet apart and lie at roughly the same level, about 190 feet above the local mean tide. The position of Kent's Cavern in relation to the main topographic features of south Devon is shown in Fig. 1.

The "cavern" is actually a series of very large solution cavities linked to each other by narrow fissures. This network was carved out by the partial solution of the Upper/Middle Devonian limestone which forms the main rock type of Lincombe Hill. Dissolution of the limestone has progressed at a faster pace along lines of weakness caused by bedding planes within the limestone as well as by joints and faults at roughly right angles to these planes. Thus the overall pattern of the cavern network conforms to the distribution of large faults and joints within the limestone hill. These have permitted rapid erosion to form the high narrow galleries while the large chambers often occur at the intersection of two faults where the rock has been extensively shattered. Basically, the cavern network follows two roughly parallel fault lines which are linked at intervals by joints, thus imparting a subrectangular pattern to the cavern plan. The floor of the cavern system is relatively even, without dramatic changes in level, and evidently conforms to the bedding planes of the limestone. The system is linked by a few near-vertical shafts to a lower network of galleries also adapted to the bedding of the limestone. The lower group is smaller than the main system, contains no archaeological deposits, and needs no further mention here.

During almost two centuries of exploration in the caverns an astonishing variety of names has been used to label different areas. Almost every crevice and niche in the system has its own name and many of these have been used in labeling the fossils and artifacts found by various pioneer excavators. The use of place-names in the cavern was standardized by Lake (1934), who produced the first reliable survey of the system. The cavern plan shown in Fig. 2 provides a useful summary of the names now in use. Both the size and the position of each gallery and chamber is shown; detailed descriptions of each of these will serve no useful purpose here, since only a few are of archaeological importance, but individual "sites" within the cavern system will be referred to by name and number.

The cavern system has been partly filled with deposits formed by different processes at various times since the middle Pleistocene or probably earlier. The main constituent of the cavern deposits is secondary limestone in the form of stalagmite, travertine and breccia cement. Water dripping from the roof and walls of the cavern is saturated with calcium carbonate, which is redeposited on the cavern floor during evaporation of the water by air currents passing through the network of galleries and chambers. The speed of evaporation determines which form of secondary limestone will be deposited. Thus thickness, hardness and the type of formation are all controlled by fluctuations in air currents and water seepage. The other main constituents of the cavern deposit are pebbles and sands. These are partly derived from within the cavern by localized collapsing of the roof. Individual grains of harder impurities in the limestone are also released from the roof and walls during dissolution. Pebbles and sands from the hillslope outside may enter the system through fissures and solution cavities (including the two entrances) to form deposition cones at different points in the system. Obviously, the distribution of this "cave earth" is localized. It may be distributed by running water and is frequently cemented into a hard breccia by travertine deposition.

Several different processes have therefore contributed materials to the cavern fills: water seepage, dissolution, evaporation, roof collapses, hillwash, stream transport, and erosion. Each process may fluctuate through time and each varies in importance from one part of the cavern to another. The nature of the cavern fill, therefore, varies greatly in both vertical and horizontal directions. Factors such as rainfall fluctuation, air temperature changes, opening or blocking of the cavern entrances, and erosion of the outside hillslope, all influence the kinds of deposition taking place within the system. The distribution of fossils and Palaeolithic artifacts within the deposits cannot be examined, therefore, without taking into account the complexity of the cavern fill itself.

Brief History of Excavations

Kent's Cavern is best known as a crucial site in the development of ideas about the antiquity of Man and it is justly famous for its role in the development of prehistoric research. Unfortunately, this fame has caused many scholars to overlook its importance for modern Palaeolithic studies. Few caves have such a long history of excavations. Apart from unauthorized digging by vandals, over 15 different excavating campaigns have been carried out here since the

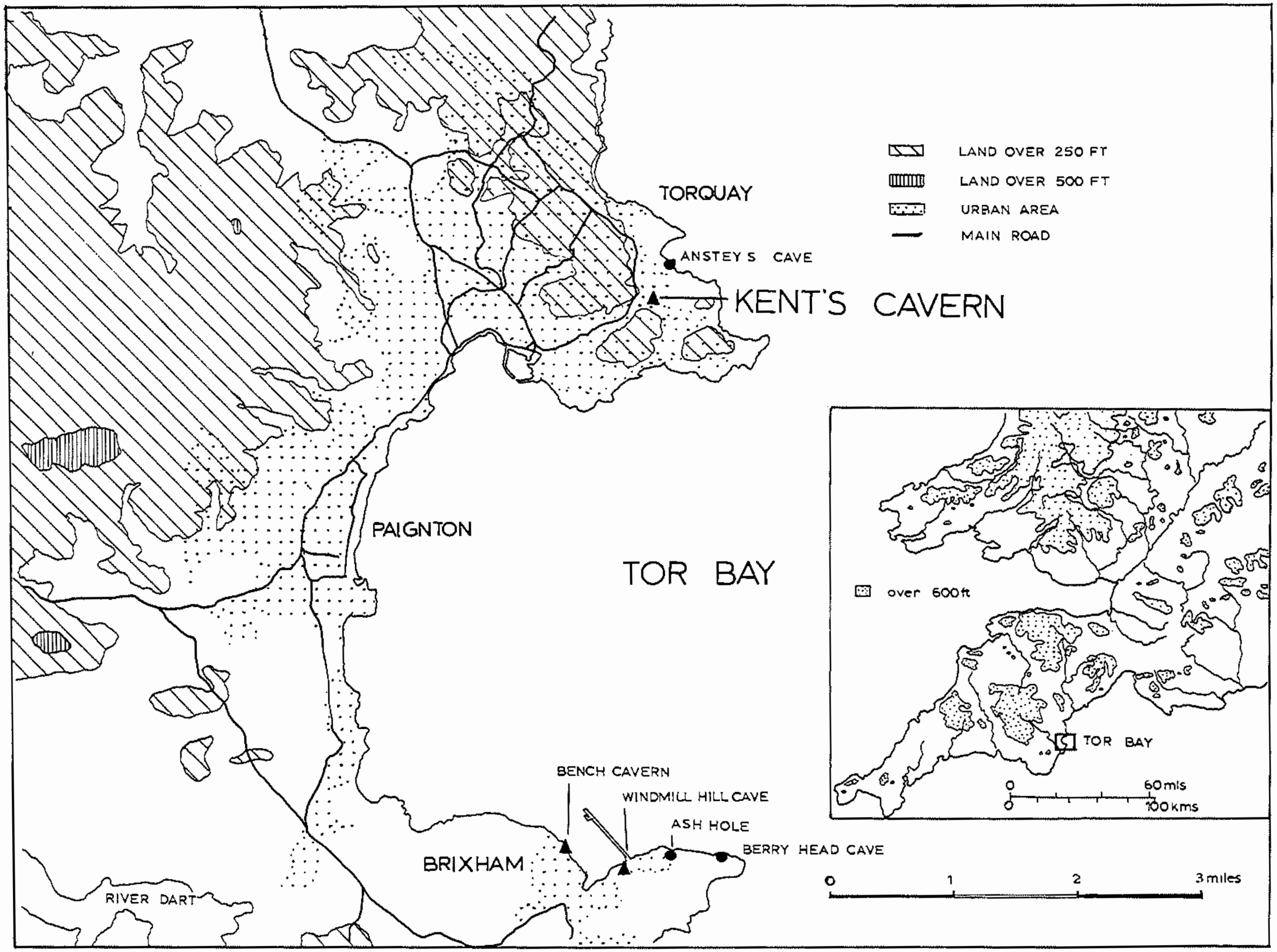
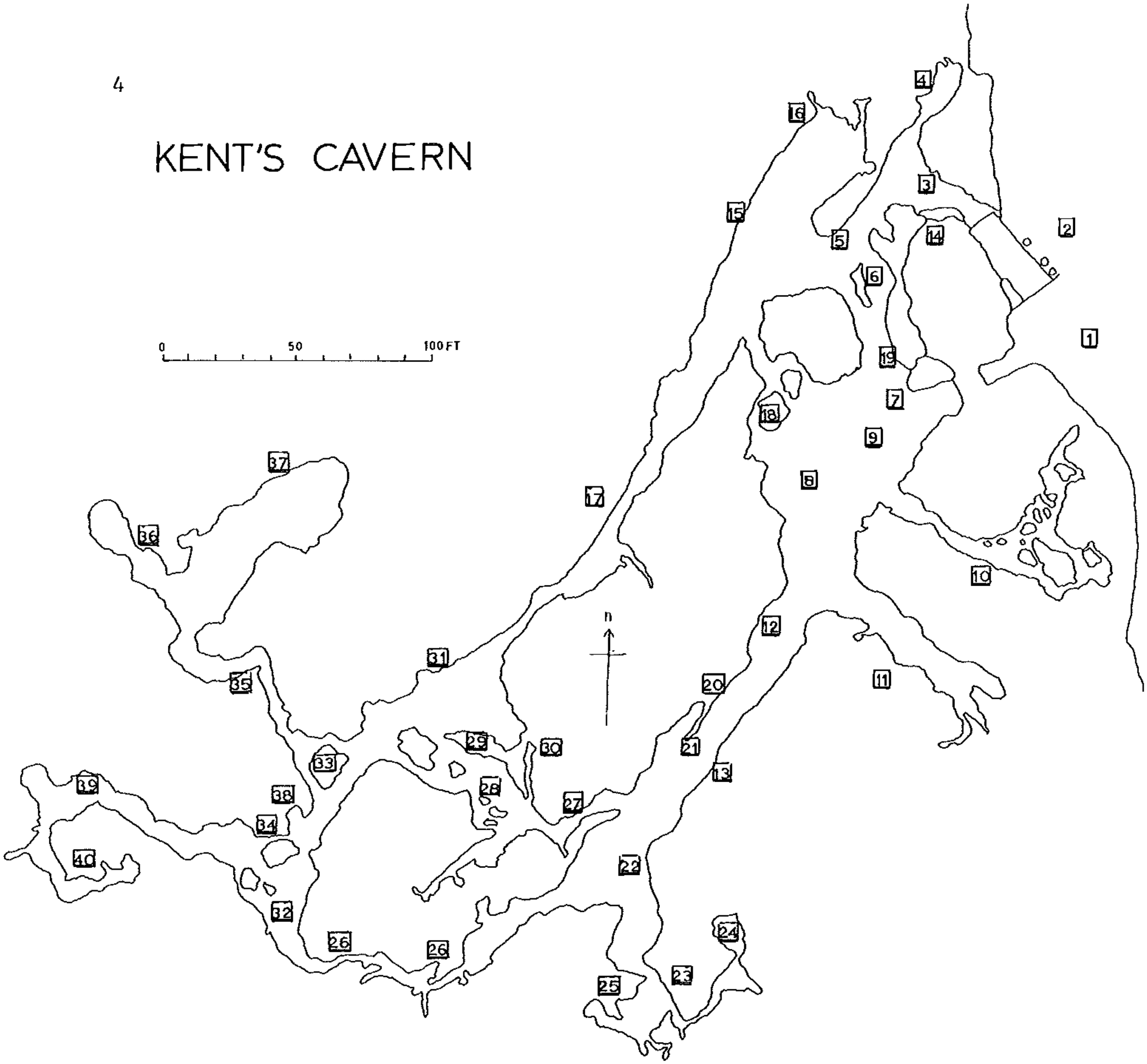


Fig. 1. Map of Tor Bay and Environs.



1 SOUTH ENTRANCE
2 NORTH ENTRANCE
3 VESTIBULE
4 NORTH EAST GALLERY
5 SLOPING CHAMBER
6 PASSAGE OF URNS
7 GREAT CHAMBER
8 GALLERY
9 LECTURE HALL
10 NORTH SALLY PORT
11 SOUTH SALLY PORT
12 SOUTH WEST CHAMBER
13 WATER GALLERY
14 SMERDON'S PASSAGE
15 WOLF'S CAVE
16 CAVE OF RODENTIA
17 LONG ARCADE
18 CHARCOAL CAVE
19 COX S PASSAGE
20 CRYPT OF DATES
21 THE LAKE
22 BEAR S DEN
23 THE TORTUOS GALLERY
24 THE TERMINAL CHAMBER
25 UNDERVAULT
26 GREAT OVEN
27 MATHEWS PASSAGE
28 LABYRINTH
29 UNDERMAY S GALLERY
30 LITTLE OVEN
31 THE BRIDGE
32 CAVE OF INSCRIPTIONS
33 HEDGES BOSS
34 INSCRIBED BOSS
35 CLINNICK S GALLERY
36 ORGAN CHAMBER
37 ROCKY CHAMBER
38 THE ALCOVE
39 HIGH LEVEL CHAMBER
40 SWALLOW HOLE GALLERY

Fig. 2. Plan of the Kent's Cavern system, after Lake (1934).

early 19th century. Some of them lasted several years while others consisted merely of brief excavations of small test pits. The progress and exact distribution of these excavations within the system have not been analyzed yet but A. S. Kennard (1945) has provided a general history of the sequence of visitors to the site.

The first recorded excavation was that of Thomas Northmore in 1824. This was a small dig conducted without adequate field notes (Northmore 1868), like that of Sir W. C. Trevelyan later in the same year. In 1825 Northmore returned to the site with Sir T. Acland and the famous Dean W. Buckland, foremost geologist of the time. After some casual digging these gentlemen concluded that the site had not been occupied by man much before the Roman occupation as, indeed, they had expected. Evidently these first excavations penetrated only the dark superficial deposits of the chambers nearest the entrance. As these deposits contained only Iron Age artifacts, the excavators' conclusions are understandable. However, they failed to break through the hard travertine layer beneath this, perhaps mistaking it for the bedrock of the cavern.

Later in 1825 and again in 1826 the Reverend J. MacEnery together with Mr. and Mrs. Cazalet visited the site. While the Cazalets continued work near the entrances, MacEnery moved back into the Gallery (area 8, Fig. 2) where the superficial deposits were thinner. Here he managed to break through the undisturbed "stalagmite floor" to discover the softer deposit below. Within this he found flint artifacts obviously fashioned by man lying in direct association with the bones and teeth of extinct mammals. Any possibility that the flints had intruded from younger superficial deposits could be eliminated since they were sealed below the hard travertine layer. For the first time, the presence of man together with now-extinct animals had been unequivocally demonstrated. Unfortunately the intellectual climate of the time would not allow any such notions. Scholarship in England was still severely influenced by the clergy and the problem of human origins was considered to be adequately explained by the Creation as described in the Book of Genesis. Only the exact timing of the Creation need form a topic for genteel debate, thus leading Ussher and Lightfoot into their first adventures in absolute chronology.

MacEnery withheld publication of his results out of deference for the opinions of Dean Buckland, whom he respected. Having excavated further in various parts of the cavern in 1829, he later moved from the Torquay area and did no further work here. Although he left detailed records of his work in the deposits, these were not published until eighteen years after his death in a severely edited version of his manuscript (Vivian 1856, 1859). A much fuller version was published ten years later (Pengelly 1869).

Other poorly recorded digs took place in 1826 again by Trevelyan and in 1840 by R.A.C. Godwin-Austin. Then in 1847 and 1848 the newly formed Torquay Natural History Society dug small areas in the Lecture Hall (area 9, Fig. 2) and Southwest Chamber (area 12, Fig. 2). From 1865 to 1880 the most extensive and careful work carried out thus far at the Cavern was conducted by W. Pengelly with some help from E. Vivian. Pengelly laid out a grid system of 1 ft. wide parallels intersected at right angles at 1 yard intervals. This system of 1 ft. by 3 ft. grids was employed throughout most of the Cavern to sustain horizontal control. For vertical control he dug in 1 ft. levels or spits consistently to a depth of 4 ft. beneath the "stalagmite floor" first penetrated by MacEnery. In the Long Arcade (area 17, Fig. 2) Pengelly dug to bedrock at about 9 ft. below the stalagmite layer. He carefully recorded his observations on the composition, texture and color of the various layers which he encountered, and he assigned find-numbers by "prisms" (that is, by parallel, yard, and level) to all artifacts, bones, and teeth. He published monthly and annual reports on the progress of his excavations (Pengelly 1868, 1871, 1878) and a final summary of these (1884). Although he recorded in his diary literally thousands of the appropriate measurements, he never published the detailed sections and plans of the deposit which his notes provide. Nor did he present illustrations of any of the artifacts, although a small selection of these was drawn by Sir John Evans shortly after their discovery (Evans 1872).

Interest in the site lagged until Miss D.A.E. Garrod published **a fairly detailed account** of the Upper Palaeolithic assemblages found by Pengelly (Garrod 1926). Then intermittently from 1926 to 1940 A. H. Ogilvie and other members of the Torquay Natural History Society excavated the remainder of the deposits in the Vestibule (area 3, Fig. 2) and the Northeast Gallery (area 4, Fig. 2). They also dug in the Gallery (area 8, Fig. 2) and the Sally Ports (areas 10, 11, Fig. 2). Appalling as it now appears, they kept poorer records than Pengelly. In fact, for most of their finds one only knows that they come from Kent's Cavern, since no data on locality or even depth were recorded. They published only brief of accounts of their discoveries (Dowie 1928; Benyon et al. 1929; Smith 1940). These works were followed by an interpretation of the geological setting of the site (Vachell 1953) and some dubious opinions on the stratigraphy of the so-called "cave-earth" (Rogers 1955).

From about 1880 onwards, the owners of Kent's Cavern perceived the financial worth of the site and began to develop it as a "show cave" to attract a tourist trade. Most of the system is lighted and the deposits of all the main chambers and passages are now covered by a concrete floor. Numerous unrecorded excavations have been carried out by the proprietors. Most of these penetrate 2 to 3 ft. deeper than Pengelly's work and are mainly restricted to lesser chambers and passages. Excavation is presently in progress in the Wolf's Cave (area 15, Fig. 2).

Stratigraphy of the Deposits

By analyzing the descriptions and measurements recorded by Pengelly in his diary (1865-80), it has proved possible to reconstruct, in plan and section, the layout of his excavations in the major deposits. Fig. 3 shows a plan of the more important eastern part of Kent's Cavern according to measurements given in the diary. It is this area which has yielded most of the archaeological and environmental evidence. On the plan also appear the lines of the two sections shown in Figs. 4 and 5.

The Southern section (Fig. 4) is drawn on Pengelly's data lines which are projected on a single plane. The Vestibule section (Fig. 5) is drawn on notebook data and is also projected on a single plane. Information from Ogilvie's few adequately labeled finds has been added to this section. The vertical scale of both sections is exaggerated in relation to the horizontal for the sake of clarity. The deposits and finds from the entrance platforms were not recorded in any detail by Pengelly as he considered them to have been disturbed by earlier diggers. Actually this proved to be true of only the upper portions. The Sloping Chamber and the North and South Sally Ports (sites 5, 10, 11, Fig. 3) are recorded within his grid system but are also considered to be disturbed.

The sequence of deposits in this area may be summarized as follows:

F/D Black Mould. Vegetable matter and sandy silt with Mesolithic, Neolithic, Bronze Age, Romano-British, and Medieval artifacts and faunas (0-1 ft. thick).

C2 Granular Stalagmite. Travertine with Mesolithic and Neolithic artifacts and faunas (0-5 ft. thick).

B2 Stony Cave Earth. Sharp angular limestone fragments in a light red sand/silt matrix with Later Upper Palaeolithic artifacts and faunas. In the Vestibule there is a palimpsest of Later Upper Palaeolithic hearths known as the Black Band (0-6 ft. thick).

A2 Loamy Cave Earth. Light red silty sand with some angular and rounded limestone fragments. Earlier Upper Palaeolithic artifacts and faunas occur at the very top of these deposits, and Middle Palaeolithic artifacts and faunas are distributed through the main body of the layer. A2 grades into B2 without any distinct interface between the two layers (0-30 ft. thick).

C1 Crystalline Stalagmite. Layer of very hard flowstone in Southwest Chamber and Gallery only (0-12 ft. thick).

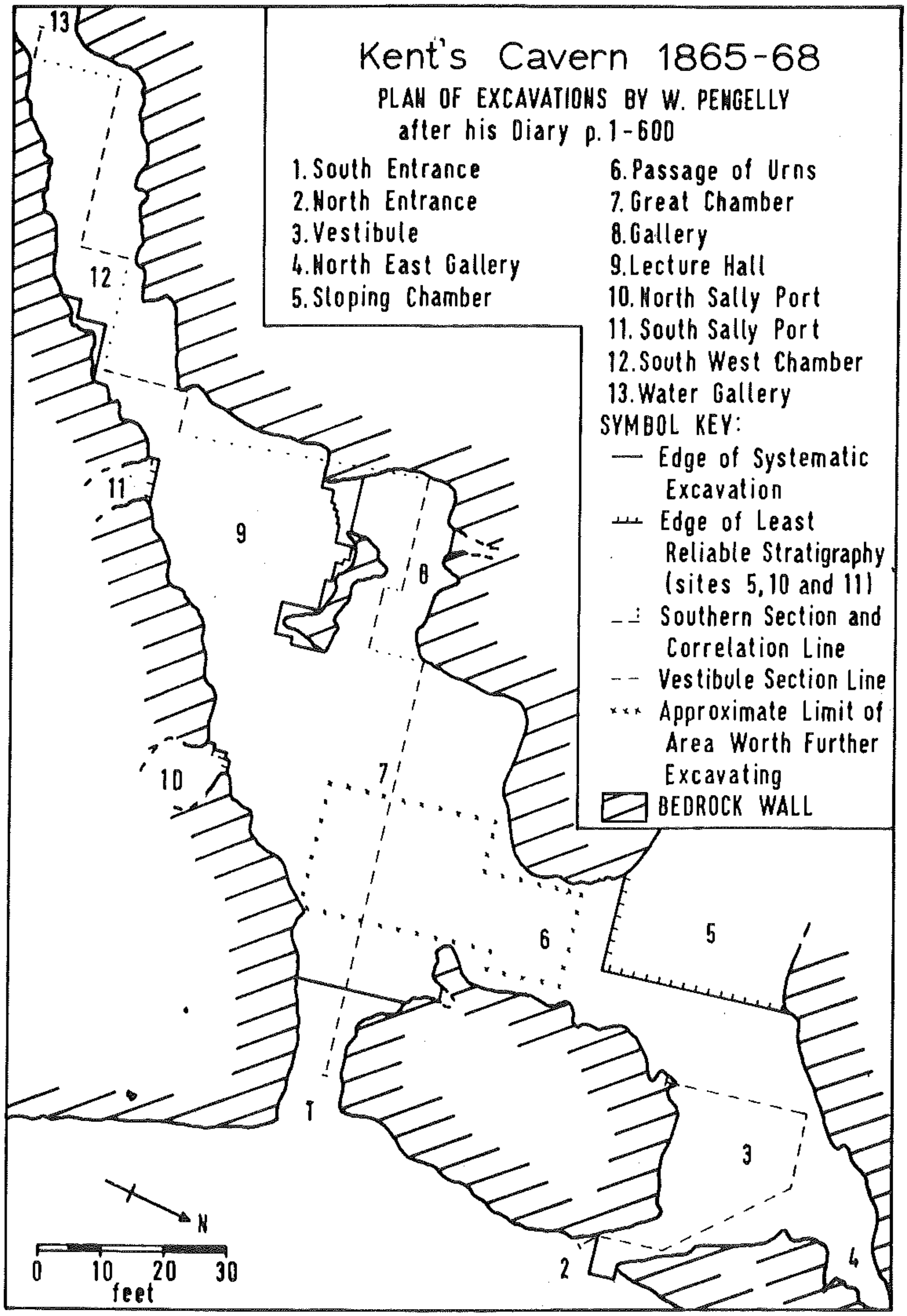


Fig. 3. Plan of Pengelly's Excavations, 1865-68.

B1 Breccia. Both angular and rounded limestone fragments cemented in a dark red sand/silt matrix. Contains massive concentrations of bear remains and other fauna together with a Lower Palaeolithic industry (0-9 ft. thick).

A1 Red Sand. Dark red sand/silt with very few artifacts and faunal remains (0-3+ ft. thick).

C0 Older Crystalline Stalagmite. Recorded by Pengelly as fragments of very hard flowstone in B1 and as traces on the walls of the cavern. Some of the wall fragments probably belong to C1.

A0 Laminated Silts. Laminated sands, silts and clays on bedrock. Pengelly's field diary makes no mention of this basal deposit, which was presumably exposed by Ogilvie (Dowie 1928). Thickness not recorded.

Bedrock. Upper/Middle Devonian limestone.

The Vestibule section in Fig. 5 shows that the Loamy Cave Earth rests on bedrock in places. The Crystalline Stalagmite, Breccia, and other basal strata are either absent in this area or have not been reached by excavations.

In the region of the Gallery (area 8, Fig. 3) the sequence of deposits does not conform to that listed above. The Gallery sequence may be summarized as follows:

C1 Crystalline Stalagmite. Suspended intact above an air space with red sand adhering to the underside (1.5-3 ft. thick).

Air Space (4 in.-3 ft. thick).

F/D Black Mould. A thin layer only (0-3 in. thick).

C2 Granular Stalagmite. Contains a few fragments of extinct fauna (7 ft.-2 ft. 2 in. thick).

A2 Loamy Cave Earth. Contains some Middle and Earlier Upper Palaeolithic industries, but the associated fauna includes *Homotherium latidens* which is amost certainly derived from an earlier layer. This deposit also contains abundant fragments of C1 Stalagmite and B1 Breccia. Similar fragments occur in the Loamy Cave Earth of the Southwest Chamber (area 12, Fig. 2), Wolf's Cave (area 15, Fig. 2), and Long Arcade (area 17, Fig. 2) (2-3 ft. thick).

A1 Red Sand (1-3 ft. thick).

Bedrock has not been reached by excavation in this region.

The sequence of depositional events within the area mapped in Fig. 3 may be provisionally summarized as follows, based on the units described above.

A0. Sands and silts partially derived from the outside hill-slope carried through the system and graded by running water. Localized deposits only.

C0. Increase in ground water seepage into the cavern system formed (probably localized) flowstone sheets by slow evaporation of standing water.

A1. Sandy material probably derived from the outside hill-slope was distributed through the Southwest Chamber and Gallery. Its presence in the Great Chamber and Vestibule has not been ascertained, and the source or direction of entry is not known. Either the South Entrance or some undiscovered fissure may have allowed a relatively rapid accumulation of hillwash to be distributed by running water, thus preventing the lime-saturated roof seepage from cementing the sands. In the Gallery this deposit attained a maximum thickness of over 10 ft.

B1. Accumulation of the red sandy (hillwash?) material continued, but probably at a slower rate. Roof and wall seepage saturated the sands with carbonate cement which ultimately hardened the deposits. Scree blocks and C0 flowstone lumps were introduced, possibly by frost-shattering of the roof, or by stream action. The cavern was periodically occupied by large carnivores and hominids who deposited bones and cultural debris in localized patches. The whole mass was cemented together to form a breccia.

C1. Access to the outside slope may have become temporarily blocked at this stage since sandy materials were no longer accumulating and there is no evidence for rapid stream action. A thick deposit of flowstone was laid down in the Gallery and Southwest Chamber, nearly filling both cavities. It is not known whether this deposit also covered the Great Chamber or Vestibule.

Erosion Cycle. The growth of the thick C1 crystalline stalagmite layer may have blocked parts of the tunnel, thus damming up water in the system. Increased pressure may have caused the stalagmite blockage to burst, thus allowing rapid erosion of the C1 deposits in the western part of the Southwest Chamber, causing the underlying breccia to be exposed. In the gallery, the hard C1 Stalagmite was undercut by erosion which removed all the breccia and some 6 ft. of the Red Sands, thus leaving the C1 Stalagmite suspended on the Gallery roof, with a deep air space below it. Fragments of the C1 Stalagmite were left adhering to the walls of numerous other cavities in the system (Fig. 4).

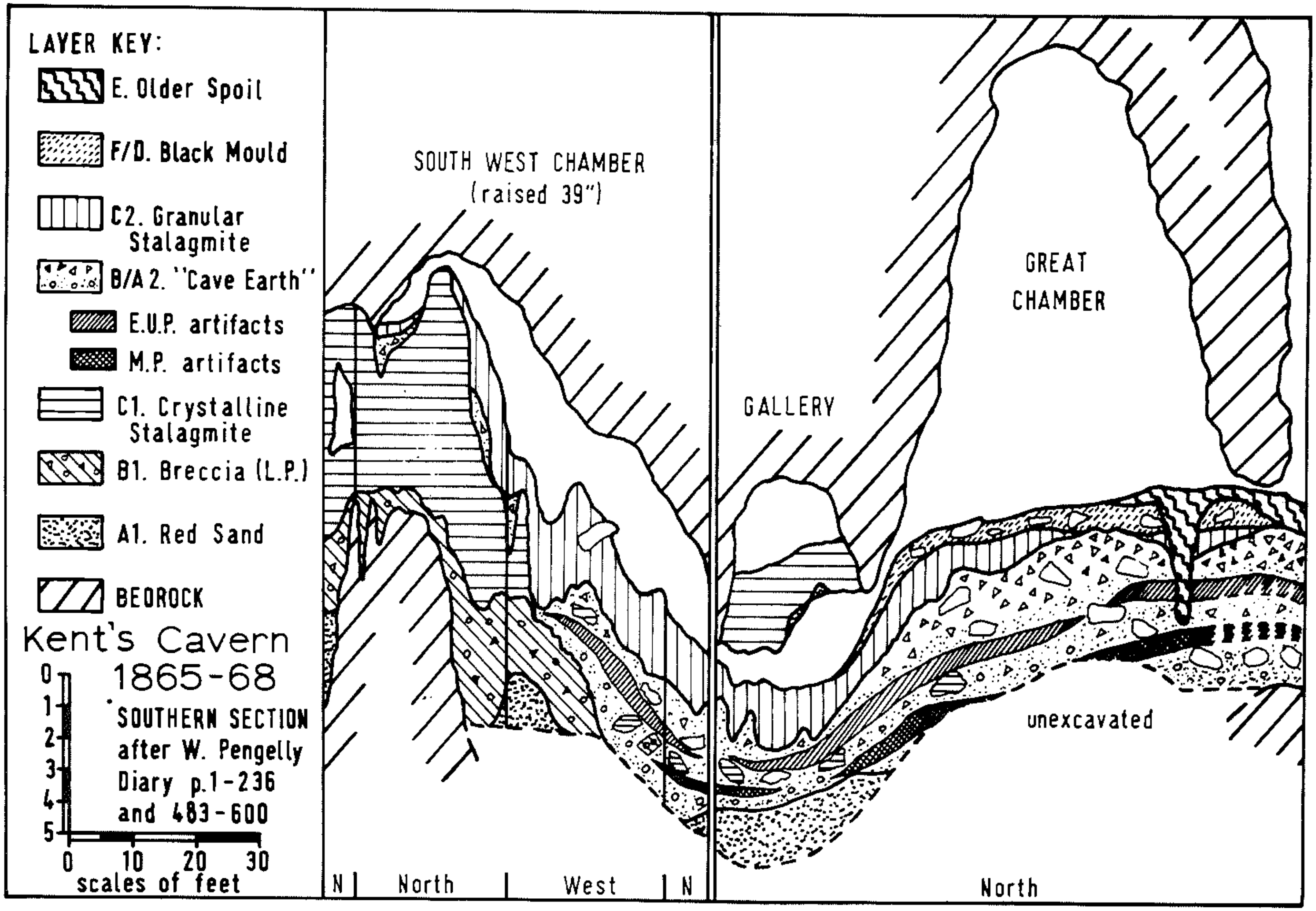


Fig. 4. Section through the deposits of the Great Chamber, Gallery, and Southwest Chamber.

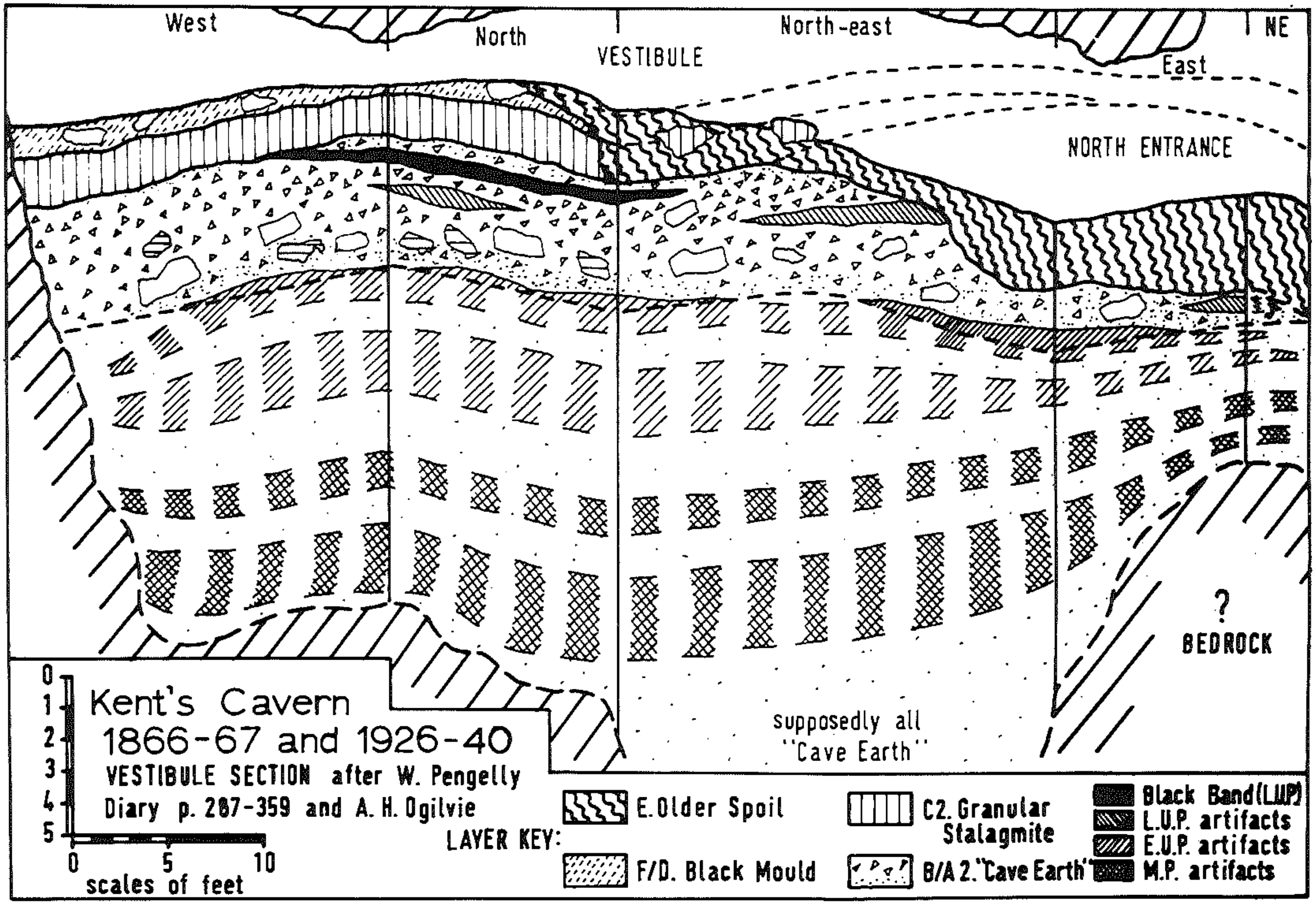


Fig. 5. Section through the deposits of the Vestibule and North Entrance.

A2. This deposit was a relatively rapid accumulation of sand-silt which may prove to be a mixture of outside hillwash materials and redistributed cave sediments. Fragments of B1 Breccia and C1 Stalagmite fell from the walls into this deposit, thus introducing some earlier faunal elements into it. There was at this time periodic occupation of the cavern by hunters and possibly carnivores. In the Vestibule this appears to be the earliest deposit, resting on bedrock in places (Fig. 4).

B2. The A2 Silty Sand continued to accumulate, but frost-shattering of the walls and roof introduced an increasing amount of thermoclastic scree into the deposit. This scree became very dense towards the end of the cycle. Periodic occupation by hunters occurred, mainly in the Vestibule. The A2/B2 deposits banked up against a thick boss of earlier C1 Stalagmite in the northern area of the Southwest Chamber (Fig. 4).

C2. The effects of water seepage again dominated and less hillwash material was accumulated. A thick layer of flowstone was laid down over the whole area, covering the C1 Stalagmite and B1 Breccia in parts of the Southwest Chamber and the B2 Stony Cave Earth in the rest of the area.

F/D. A relatively thin accumulation of sediment, organic matter, and cultural debris was laid down on the flowstone. Parts of the deposit were churned into C1 and B2 by human action. A thin layer of stalagmite partially covered this deposit, probably during historical times.

The extent to which the sedimentary history of the cavern deposit has been affected by large-scale climatic oscillations cannot be determined without more detailed investigations. Stalagmite is forming today over part of the F/D deposits, and the archaeological content of the Stony Cave Earth B2 suggests that this was forming during the intensely cold period of the later part of the Last Glaciation. However, the loose association of travertine deposition with interglacials, and scree breccias with glacial periods cannot be considered seriously, since so many other factors have influenced the deposition. Any attempt to fit the sequence of deposits into the broader glacial chronology for Western Europe would be futile at this stage. Detailed granulometric and mineral analyses of all the deposits are urgently needed, and a finer subdivision of the very thick A2/B2 Cave Earth should be possible on the basis of such analyses.

The Fauna

Large faunal assemblages have been recovered from the B1 Breccia, the A2 Loamy Cave Earth and the B2 Stony Cave Earth. The B2 fauna is virtually restricted to the Vestibule (area 3, Fig. 3) area and comes mainly from the so-called Black Band or hearth palimpsest near the top of the Cave Earth deposits.

The two major faunal collections are those of Pengelly and MacEnery which are housed mostly at the Torquay Museum and British Museum (Natural History). Of these two, Pengelly's collection is the best annotated since the notes in his diary provide provenience data for each specimen. Unfortunately some of MacEnery's specimens have found their way into several different museums, and exact provenience data are missing for most specimens. Data on fauna obtained during other excavations are so inadequate that they cannot be considered here. The following account is based on counts taken from Pengelly's collection only, with some reference made to a few important specimens found by MacEnery in the B1 Breccia of the Long Arcade (area 17, Fig. 2).

No analysis of the numerous post-cranial remains has been attempted yet, and only the teeth are considered in this analysis. Pengelly recorded the identity of each specimen found in situ and most of these have been checked for accuracy and found to be correct. The tooth counts in Table 1 are compiled from Pengelly's diary; the scientific names are those in current use (e.g. Kurten 1968). Important specimens recorded by other authors are annotated accordingly.

The B1 Breccia. Table 1 suggests that the B1 assemblage is dominated by cave bear (90% of all remains), the bones of which formed dense concentrations in the breccia. The Torquay collection contains more bear teeth than are recorded in Pengelly's notes, but those unrecorded speciments have been omitted from the table. Of the Homotherium specimens, one tooth was found by Pengelly in the Long Arcade (area 17, Fig. 2) and the other six were found by MacEnery in Wolf's Cave (area 15, Fig. 2). It is unfortunate that not one of these comes from in situ breccia; all were found in or among breccia blocks located in the lower portions of the Cave Earth. This is also true of the A. greeni and P. gregaloides specimens. A controversial molar of Hippotomus major once thought to belong in MacEnery's collection is now considered to come from the Villafranchian deposits of the Val d'Arno in Northern Italy. Chemical analysis by Oakley revealed that this specimen differed entirely from two of the Homotherium teeth in fluorine content (Alexander 1964).

The A2 Cave Earth. The large assemblage from this unit comprises the fauna associated with the Middle Palaeolithic and (near the top) Earlier Upper Palaeolithic industries. It has not proved possible to separate the Cave Earth fauna into two discrete assemblages, although further planned analyses of the complete collection may resolve the problem. All the tooth counts are again from Pengelly's notes and the specimens marked "rare," etc., are extracted from other sources (Evans 1872). Inspection of the lists in Table 1 will show that the Cave Earth fauna is dominated by hyena (27%), woolly rhinoceros (15%), and horse (36%). The species list fits well with those for other Last

Carnivora	B1 Breccia	A2 Loamy Cave Earth	B2 Black Band
Crocuta crocuta	-	228	2
*Homotherium latidens	7	-	-
Felis leo	1	16	1
Gulo gulo	-	+"rare"	-
Meles meles	-	2	1
Canis lupus	-	4	-
Vulpes vulpes	2	19	1
Ursus spelaeus	104	-	-
Ursus arctos	-	20	7
Proboscidea			
Mammuthus primigenius	-	17	-
Perissodactyla			
Coelodonta antiquitatis	-	131	2
Equus germanicus	-	309	17
Artiodactyla			
Cervus/Rangifer	-	75	2
Megaloceros	-	25	4
Bison/Bos	-	7	1
Rodentia			
Castor fiber	-	+"rare"	-
*Arvicola greeni	1	-	-
A. terrestis-amphibius	-	+"rare"	-
Microtus agrestis	-	+"rare"	-
*Pitymys gregaloides	2	-	-
Lagomorpha			
Ochotona pusilla	-	+"very rare"	-
Lepus timidus	-	+"rare"	-
Total Teeth	117	853	37

*indicates specimens found by MacEnery between 1825 and 1829.
+indicates species listed by Evans (1872) but not by Pengelly.

Table 1. Tooth-counts compiled from Pengelly's diary.

Glacial deposits, including as it does animals adapted to subarctic and boreal habitats. Changes in faunal composition through time within this deposit have not been studied yet, but the locality and depth data given in Pengelly's diary should permit such an analysis.

The B2 Cave Earth and Black Band. Most of the material in this relatively small assemblage comes from the Vestibule (area 3, Fig. 2). Both *Mammuthus primigenius* and *Felis leo* are absent; there are fewer *Crocuta* and *Coelodonta* than in the lower levels, and the assemblage is dominated by *Equus* (46%) and *Ursus arctos* (19%). There is nothing in this list which suggests a date other than late Last Glacial.

The horizontal and vertical distribution of fauna within the Cave Earth has not been analyzed and the exact spatial relationships between fauna and associated artifact scatters are not known. For this reason it is impossible to assess the causes of bone deposition in the different layers. If the massive bear-bone accumulation found in the B1 Breccia is actually the result of specialized hunting activity by Early Acheulian groups, this would constitute a unique example of such behavior. However, hominid activity need not be the only cause of bone accumulation and it is possible that bears became trapped in the Cavern, fell to their death, or crawled into the cave to die of wounds or old age. Until a detailed body-parts analysis of the assemblage has been carried out, and the results compared with other cave-bear assemblages from the European Palaeolithic, no definite statements on the problem can be allowed. Similarly the Cave Earth assemblage requires further analysis to determine how much of the fauna can be directly linked with hominid activities and how much has been deposited by natural processes. It is equally uncertain whether the A2 Cave Earth contains any primary-context hominid occupation horizons. If fauna and artifacts prove to have been disturbed or distributed by running water during this period, it may prove difficult to determine which animals are to be associated with hominid activity within the Cavern. Only in the Black Band of the Vestibule can we be reasonably certain that the faunal assemblage comes from a series of primary-context hearths and there is little reason to doubt that this collection reflects butchering activity by later Upper Palaeolithic hunters camping in the cave.

Pollen Analysis

During a visit to Kent's Cavern in February 1969, three large sediment samples were taken from A1, the basal Red Sands in the Bear's Den (area 22, Fig. 2); A2, the Loamy Cave Earth between the Gallery (area 8, Fig. 3) and the Lecture Hall (area 9, Fig. 3; and B2, the Stony Cave Earth in a section adhering to the walls of the Vestibule (area 3, Fig.).

About 100 grams of sediment from each sample were treated at the palynology laboratory of the Pitt Rivers Museum, Oxford. A series of acid baths were used prior to applying routine preparation techniques and total grain counts were taken for each sample. The A1 Red Sand sample yielded only two grains: one of Salix(?) and one of Valeriana(?). This result at least demonstrates the presence of pollen in the basal deposits of the sequence and it is expected that more rigorous preparation of still larger samples will provide adequate counts for assessing local vegetation patterns during this period.

Both of the other samples yielded sufficient pollen to provide percentage comparisons (Table 2). Each of these showed relatively high percentages of herbs: herb pollens account for 68% of the grains in the Loamy Cave Earth, and 61% of those in the Stony Cave Earth, possibly reflecting a rather open vegetation. Among the tree/shrub pollens in the Loamy Cave Earth sample, Salix and Juniperus dominate the other types, possibly reflecting subarctic conditions. The rare occurrence of thermophilous genera like Tilia and Quercus may be the result of wind transport from further south but this cannot be confirmed without further investigations. The possible presence of Menyanthes among the herbs is even more intriguing as it is a plant which is both aquatic and insect pollinated.

In the Stony Cave Earth the predominant type among the tree/shrub group is Juniperus, which may indicate less severe sub-arctic conditions than those of the earlier period. Certainly, the quantity and range of herbiage indicated in both deposits appears adequate for the support of the larger herbivores present among the fossil fauna.

Obviously, until a more complete sample column is analyzed, the precise dating of these pollen spectra cannot be considered. The pollen counts suggest a Last Glacial date for the Cave Earth complex as a whole--a conclusion also supported by the faunal evidence.

Acheulian Artifacts from the B1 Breccia

Almost all the excavations in the B1 Breccia were conducted by Pengelly, who recovered Acheulian artifacts from the Great Chamber (area 7, Fig. 3), the Southwest Chamber (area 12, Fig. 3), the Long Arcade (area 17, Fig. 2), the Cave of Inscriptions (area 32, Fig. 2), the Cave of Rodentia (area 18, Fig. 2), and the Clinnick's Gallery (area 35, Fig. 2). A few specimens were probably removed by later excavators, but no record of their locality or depth has survived.

	A2 Loamy Cave Earth		B2 Stony Cave Earth	
	Count	Per Cent	Count	Per Cent
Trees and Shrubs				
Pinus	1	0.96	1	1.56
Juniperus	8	7.69	10	15.63
Tilia	1	0.96	-	-
Hippophae	3	2.89	-	-
Betula	2	1.92	1	1.56
Quercus	1	0.96	-	-
Populus?	2	1.92	2	3.13
Salix	11	10.58	3	4.69
Empetrum	-	-	4	6.25
Herbs				
Ranunculus	3	2.89	1	1.56
Thalictrum	-	-	1	1.56
Polemonium	-	-	1	1.56
Potentilla?	2	1.92	-	-
Rumex	6	5.77	-	-
Urtica	2	1.92	-	-
Armeria	3	2.89	-	-
Menyanthes?	2	1.92	-	-
Linaria?	1	0.96	-	-
Galium	1	0.96	-	-
Artemisia	1	0.96	-	-
Other Compositae	2	1.92	2	3.13
Cyperaceae	27	25.96	18	28.13
Gramineae	21	20.19	16	25.00
Ferns and Mosses				
Lycopodium	1	0.96	2	3.13
Selaginella	2	1.92	1	1.56
Equisetum?	-	-	1	1.56
Botrychium?	1	0.96	-	-
Total Pollen and Spores	104	99.98	64	100.00

Table 2. Pollen counts from the Loamy Cave Earth and Stony Cave Earth.

Table 3 lists the number of specimens found each year by Pengelly, and their depth in (1 ft. spits) within the breccia (Rogers 1955).

The deepest levels of the breccia were reached in the Southwest Chamber and the Long Arcade. Evidently, most of the flakes and cores in this collection were dispersed or lost and the surviving sample is too small to provide adequate percentage data. Rogers' (1955) analysis of 36 specimens available to him is shown in Table 4.

Unfortunately, Rogers gives no detailed contexts for these. Probably the "Mousterian" and "Levallois" elements come from the base of the Loamy Cave Earth. In 1970 J. Campbell examined specimens now housed in the Torquay Museum, the British Museum, and the British Museum (Natural History). Only 29 pieces could be located (Table 5).

The most significant elements missing from Campbell's list are Roger's "Mousterian" handaxe, his graver, and his Levallois flakes. No trace of these could be found in the collections from the breccia and it is assumed that they have been incorrectly ascribed to this deposit, since they would fit more readily with the Loamy Cave Earth sample. The surviving specimens are made of flint, excepting one handaxe, one "Clacton" flake and one fractured pebble which are of chert, possibly derived from the local Greensands. The exact source of the flint is unknown at present. The surfaces of all specimens show heavy chemical erosion and they are deeply patinated, some becoming quite chalky in texture. This apparent abrasion of the Acheulian specimens has led various authorities to suggest that they were derived from outside the Cavern system altogether (e.g. Garrod 1925). Rogers (1955) suggested that:

> "the Breccia is considered to have been carried into the cave through entrances or swallow holes at the south and west ends, now sealed up and generally not located."

Unfortunately, this opinion that the artifacts from the El Breccia are physically abraded (and therefore in a derived context) has persisted in the literature so that their great importance in Acheulian studies has not been observed. Chemical patination of flint artifacts can cause structural disintegration of their surfaces while the specimens are lying in a primary context (Hurst and Kelly 1966). There is therefore no reason to assume that these specimens have been moved any great distance from where they were made and abandoned. Had they been rolled during transport into the cave, it would be impossible to explain why the mass of bear bones and other faunal remains in the same deposit are so fresh.

If the artifacts and fauna are in true association in the breccia, a possible early age for the European Acheulian, and the

Year of Work	B. 1 ft.	B. 2 ft.	B. 3 ft.	B. 4 ft.	B. 5 ft.	B. 6 ft.	B. 7 ft.	B. 8 ft.	B. 9 ft.
1872	1	1	-						
1873	6	6	3	2					
1874	8	7	8	13					
1875	1	5	1	10					
1876	1	-	-	-					
1877	4	4	-	1					
1878	-	-	2	2					
1879	2	-	4	8					
1880	-	1	2	-	4	2	1	4	2
Totals	23	24	20	36	4	2	1	4	2

= 116 specimens

Table 3. Vertical distribution of Acheulian Artifacts in the B1 Breccia.

Tools:	Acheulian handaxes	4
	"Chelles" handaxes	7
	"Mousterian" handaxes	1
	Pebble tools	1
	"Rostro-carinates"	3
	Gravers	1
	Sidescrapers	6
Cores:		2
Flakes:	Clacton flakes	6
	Levallois flakes	5
	Totals	36

Table 4. Typology of the Acheulian sample after Rogers 1955.

Crude handaxes	14
Chopper	1
Crude cleaver?	1
Chopping-tool (unifacial)	1
Adjacent-platform flake core	1
Clacton-like flake	6
Other flakes	3
Naturally fractured "flake"	1
Naturally fractured pebble	1
Totals	29

Table 5. Typology of the Acheulian sample after Campbell.

possible occurrence of specialized hunting activities in the Early Acheulian may be considered.

Age of the Bl Breccia Acheulian. The enigmatic presence of a Late Pliocene saber-toothed cat Machairodus latidens near the bottom of the Loamy Cave Earth (considered to be derived from the Bl Breccia) has received comment from various authors including Newton (1882), Backhouse and Lydekker (1886) and Boule (1901). More recently Kurten (1963, 1968) has ascribed these specimens to Homotherium latidens, the Lesser Scimitar Cat, and he suggests that this species survived into the Last Glaciation in south Britain. Elsewhere in Europe this cat became extinct after the Cromerian (Gunz-Mindel) Interglacial with possible rare survivals into Hoxnian times. Its presence in the lower deposits of Kent's Cavern more likely indicates an Early-Middle Pleistocene date for the breccia than a late survival of the species. This earlier date is supported by the presence in the breccia of two Cromerian species. One of these, Pitymys gregaloides, is described by Hinton (1926) as characteristic of the Middle Pleistocene and is found in at least a dozen European sites ascribed to the Gunz glaciation. The other species, Arvicola greeni, is also common in sites dated to the Cromerian Interglacial or Mindel glaciation of Europe. It is interesting to note that among the abundant bear remains, Owen (1846) lists a second species, Ursus "priscus," which may have been the Villafranchian bear U. etruscus or possibly U. deningeri, which became extinct before the advent of the Hoxnian (Mindel-Riss) Interglacial of Europe. It has not yet proved possible to confirm the presence of a second species of bear among the extant collections; further systematic analysis of the collections is needed.

It may be argued from these facts that the Bl Breccia belongs to a pre-Mindel stage of the European Pleistocene chronology. The presence of the Acheulian industrial complex in Britain before the Hoxnian Interglacial has not been adequately demonstrated at any one of the more than 3,000 known Acheulian occurrences in Britain. Even if the Bl Breccia were of intra-Mindel date it would still remain the oldest known archaeological deposit in England. Elsewhere in Europe, only two other Acheulian sites provide sufficient associated environmental data to support an intra-Mindel date. These are Terra Amata reported by de Lumley (1966) and Torralba/Ambrona reported by Howell (1966). Neither site appears to contain any pre-Mindel faunal elements such as those at Kent's Cavern. The possibility that this site reflects the earliest appearance of the Acheulian complex in Europe should therefore be seriously considered.

Furthermore, the typology of the small surviving artifact collection from the breccias contains no features which would preclude ascribing the sample to the Early Acheulian. Although the sample is small and now incomplete, the handaxes are of special interest: they are thick, assymetric specimens with irregular plan-form and relatively few, deep-biting flake scars. Such relatively "crude" manufacture would be in keeping with other earlier Acheulian samples such as those of the two European intra-Mindel sites mentioned above as well as those from Early Acheulian sites of Africa such as Ternifine (Arambourg 1955) and possibly Sidi Abderrahman (Biberson 1961), Olduvai (Leakey 1967), Peninj (Isaac 1965) and Swartkrans (Leakey 1970). Generalizations about the origins of the Acheulian complex in Africa and its dispersal into Western Europe may require revision in the light of the Kent's Cavern evidence.

Specialized Early Acheulian hunting activities. Since the fauna from the Bl Breccia is dominated by cave bear bones, their association with Acheulian artifacts requires further explanation. Those authorities who have assumed that the artifacts are in a derived context deny any connection between the bear bones and hominid activity: presumably the bones represent the carcasses of old or wounded bears which crawled into the system to die or fell to their deaths through some fissure now blocked. An alternative interpretation may suggest that hibernating bears were deliberately sought out and killed deep in the cavern system by Acheulian hunters during the winter. The extreme vulnerability of modern hibernating bears is well known. The slowed heartbeat and lowered body temperature precludes any rapid or co-ordinated movement.

Unlike most cold-adapted mammals, the female bear gives birth during the winter months during hibernation so that the infant emerges from the lair in early summer, already weaned and partly self-supporting. If winter-time killing of hibernating bears took place within the cavern system the bones of juvenile bears would be expected to occur within the sample. If death by accident, wounds or old age were the main process of bone-accumulation, more adult specimens should be expected in the sample. Although a thorough study of the bear bones has yet to be carried out, the presence of some very young specimens, as well as the localized concentration of bones, strongly suggests that hominid activity may be partly responsible for their accumulation. Should systematic analysis support the suggestion, a new aspect of Acheulian hunting activity would become apparent. Implications for the controlled use of fire for illumination need also to be considered.

Mousterian Artifacts from the Loamy Cave Earth

Pengelly originally recorded about 1000 artifacts from the Cave Earth, but only 33 of these can now be located. The exact horizontal positions of specimens in the area of the Great Chamber are plotted in Fig. 6. A second group of specimens was recovered by Ogilvie and other members of the Torquay Natural History Society in the Vestibule (area 3, Fig. 2) area between 1926 and 1941, but provenience data are lacking for all but a few. Among some 257 specimens recovered from this area, 12 have sufficient documentation to confirm that they occurred between 9 and 12 ft. deep in the Cave Earth. The typology of Pengelly's 33 extant specimens and the 12 documented specimens from the later excavation is given in Table 6.

Tools	Pengelly Collection	Ogilvie Collection
Cordiform and bout coupe handaxe	4	1
Burin	1	-
Awl	5	2
Saw	2	1
Side scraper	5	2
End scraper/saw	1 (fragment)	1
Retouched flake fragment	1	-
Waste		
Flake	9	3
Blade	2	-
Snapped flake/blade	4	2
Thermally fractured flake blade	2	2
Fractured pebble	1	-
Total artifacts	33	12

Table 6. Typology of the Mousterian from the Loamy Cave Earth.

Of the 45 specimens listed in Table 6, twenty-three are made of Greensand Chert and 22 are of flint.

The Earlier Upper Palaeolithic from the Loamy Cave Earth

The stratigraphic position of this material above the Mousterian is shown in Figs. 4 and 5. Horizontal distribution is shown in Fig. 7.

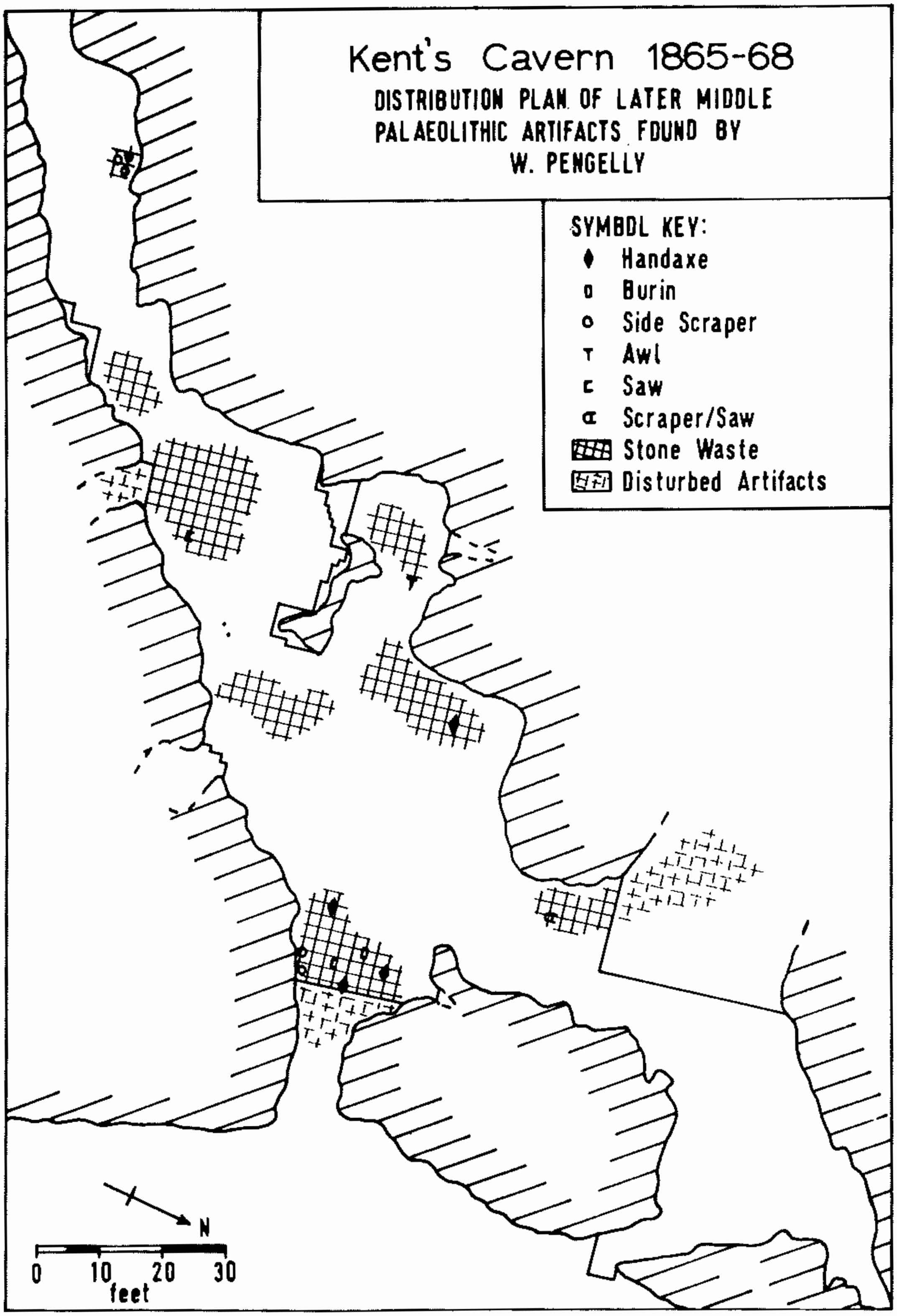


Fig. 6. Distribution of Middle Palaeolithic Artifacts.

Among the 153 stone artifacts tabulated in Table 7, only 24 are of Greensand Chert while the remainder are of flint. There is also one granite pebble probably used as a hammerstone.

Tools	Pengelly Collection	Ogilvie Collection
Bifacial leaf point	1	-
Unifacial leaf point	6	1
Tanged blade fragment	1	-
Angle burin	-	2
Busked burin	-	1
Side scraper	1	-
Side- and end scraper	1	2
End scraper on flake	9	-
End scraper on blade	3	1
Double end scraper	2	-
End scraper fragment	1	1
Carinated scraper	-	2
Nosed scraper	3	-
Saw	4	4
Concave scraper	2	2
Composite tool	2	4
Retouched flake/blade fragment	3	1
Bone awl	1	-
Tool totals	39	22
Waste		
Flake	17	2
Blade	14	5
Flake/blade fragment	47	4
Core rejuvenation flake	6	3
Cores		
Blade core	-	1

Table 7. Typology of the Earlier Upper Palaeolithic from the Loamy Cave Earth.

Until more detailed analysis of the fauna is completed, nothing definite can be said about the hunting activities of this group. Carbon-14 dates are urgently needed in order to establish the chronological position of this industry within the Upper Palaeolithic sequence

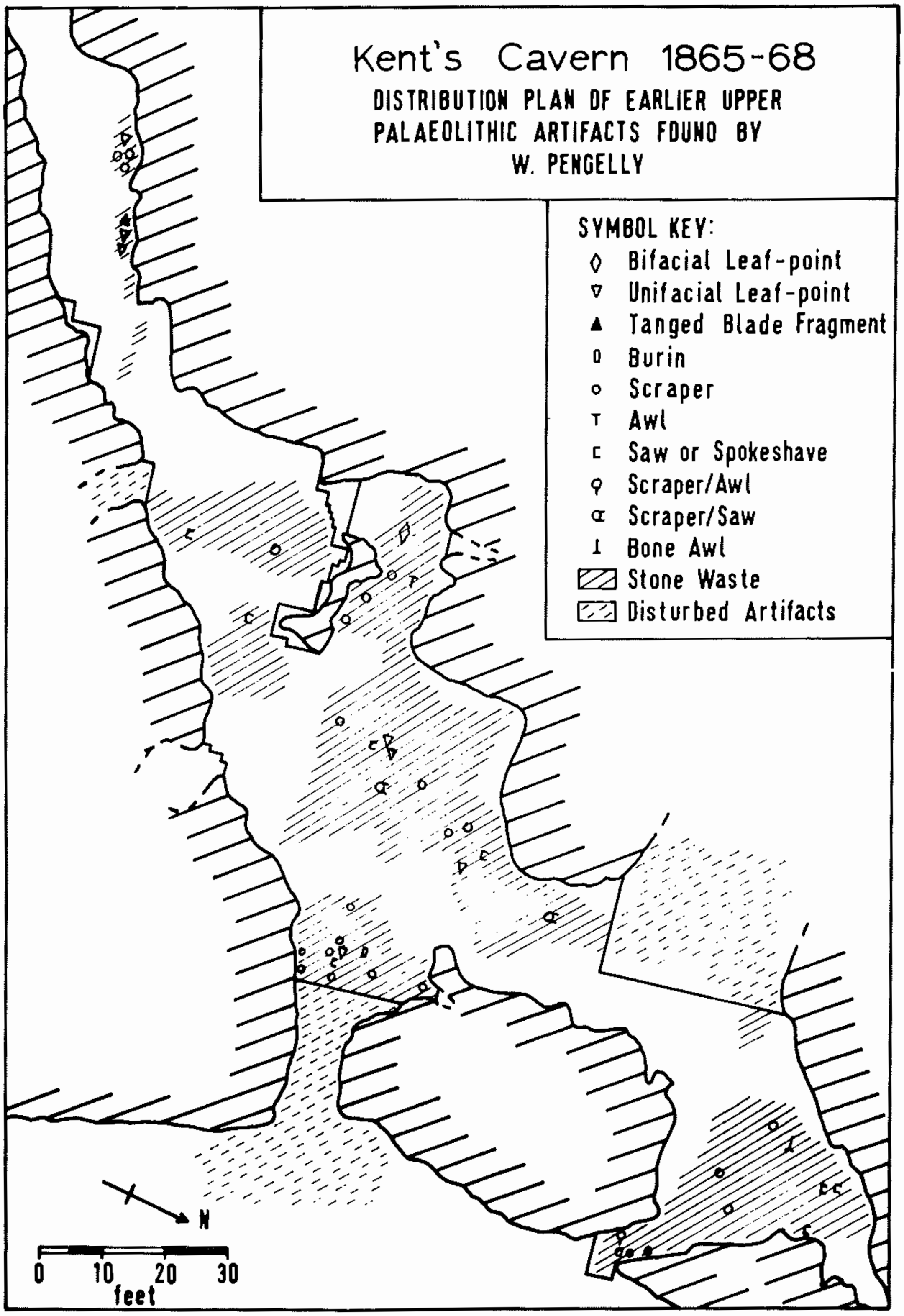


Fig. 7. Distribution of Earlier Upper Palaeolithic Artifacts.

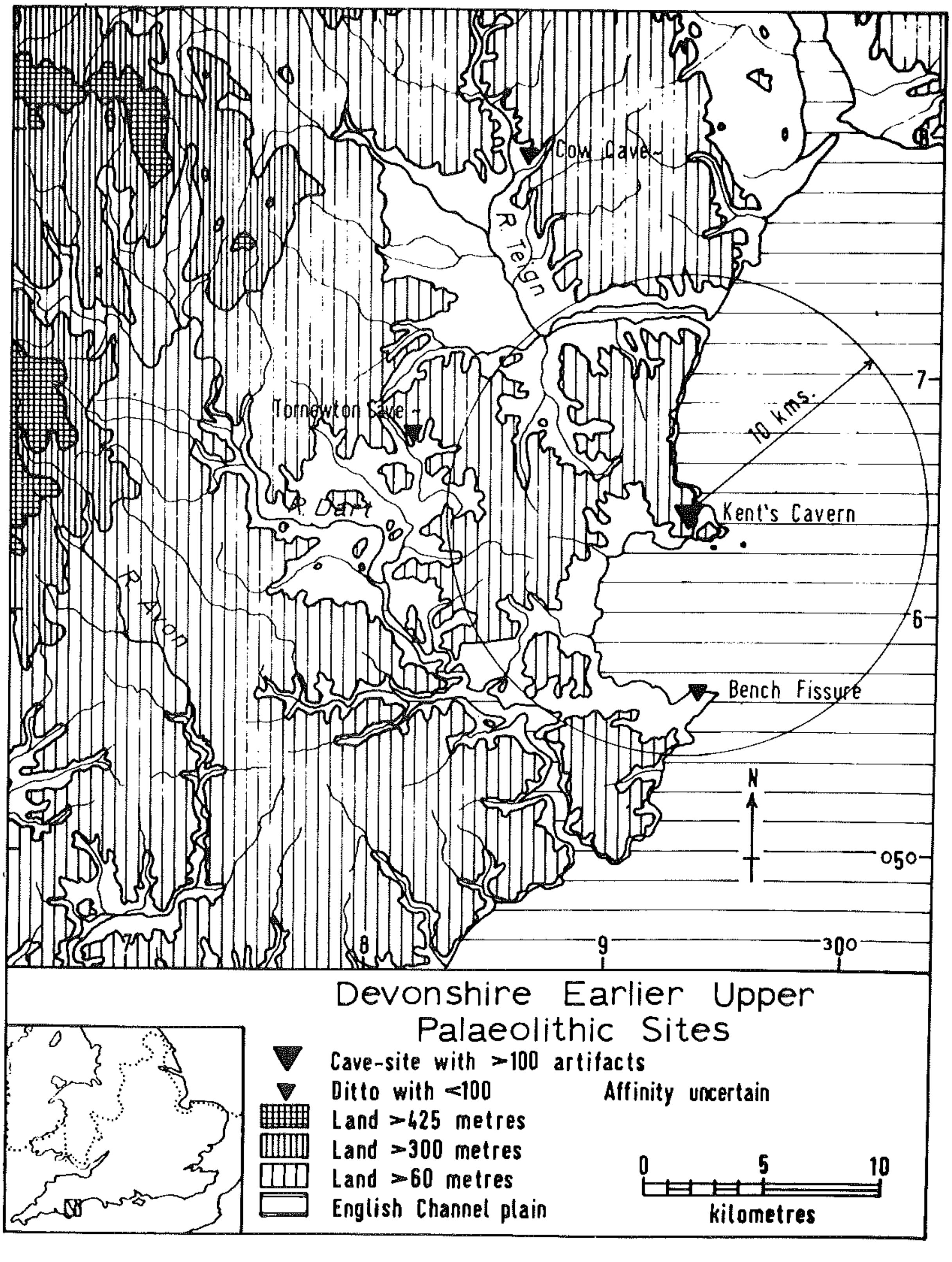


Fig. 8. Map of Earlier Upper Palaeolithic sites in South Devon.

of Northwestern Europe and in particular to establish its relationship with the Solutrean complex of Southwestern France and Spain (Smith 1966) and the Blattspitzen complex of Central Europe (Freund 1952).

Kent's Cavern is one of four known Earlier Upper Palaeolithic sites in Devon and it has yielded the largest known sample of this industry. During the maximum extent of the Last Glaciation in Britain, all four sites would have been situated in a high arctic herbaceous tundra environment. Hunters using Kent's Cavern as a base camp could have exploited the hilly watershed region to the west of modern Torquay while using the other three sites as temporary stations within easy range of the base (Fig. 8).

The Later Upper Palaeolithic or "Creswellian" Industry from the Black Band

The restricted distribution of the Black Band and its contained artifacts is shown clearly in Fig. 9. Nearly all the artifacts are concentrated in the Vestibule (area 3, Fig. 3) with a relatively few pieces located nearby in the Sloping Chamber (area 5, Fig. 3), the North East Gallery (area 4, Fig. 3), and the North Entrance (area 2, Fig. 3). Pengelly's diary records the recovery of 522 specimens from this limited area, but only part of this number can now be found.

A total of 144 specimens has been located in the Torquay, Bolton, British and British (Natural History) museums (Table 8). Specimens from disturbed deposits have not been included in the type list. Apparently Ogilvie and the other later excavators found no trace of the Black Band remaining when they began work in the cavern.

Within the sample listed in Table 8 only one burin is made of chert while the other stone artifacts are made of flint.

The "Creswell" points listed in Table 8 are triangular backed blades and the "Cheddar" points are trapeziform backed blades. The presence of these, together with the uniserial and biserial harpoons, has led some authorities (e.g. Garrod 1926) to identify the sample as "Creswellian" and/or "Magdalenian." As the tool sample is too small to provide adequate percentage figures, it cannot be compared with the larger Magdalenian samples from Southwest France. The presence of triangular and trapeziform backed blades in the peripheral Magdalenian of Western Germany (e.g. Petersfels) and Switzerland (e.g. Kesslerloch; Müller-Karpe 1966) as well as in the Tjongerian (e.g. Drunen III) and Hamburgian (e.g. Marum) of Holland and Northwestern Germany (Bohmers 1956, 1963) is becoming apparent, and their possible presence in the Magdalenian industries of Central France is being investigated.

Stone Tools	
Backed blade (convex)	1
Backed blade (straight)	1
Obliquely backed blade	1
"Creswell" point	5
"Cheddar" point	2
Burin on retouched flake fragment	3
Burin on snapped flake fragment	1
Simple burin	1
End scraper on blade	1
End scraper fragment	4
Awl	1
Saw	1
Concave scraper	6
Retouched flake/blade fragment	9
Flake with partly ground tip	1
Total stone tools	39
Bone Tools	
Bone awl	1
Eyed needle	1
Uniserial antler harpoon	2
Biserial antler harpoon	1
Total bone tools	5
Cores and Technical Waste	
Blade core	3
Core rejuvenation flake	4
Flake	7
Blade	27
Snapped flake/blade fragment	43
Thermally fractured flake/blade	16
Total	100
Grand Total	144

Table 8. Typology of the Later Upper Paleolithic from the Black Band.

The horizontal distribution of backed tools shown in Fig. 9 suggests the presence of two possibly discrete clusters in the cavern: one at the eastern end of the Black Band and another at the North Entrance. The rather crude stratigraphic evidence from Pengelly's

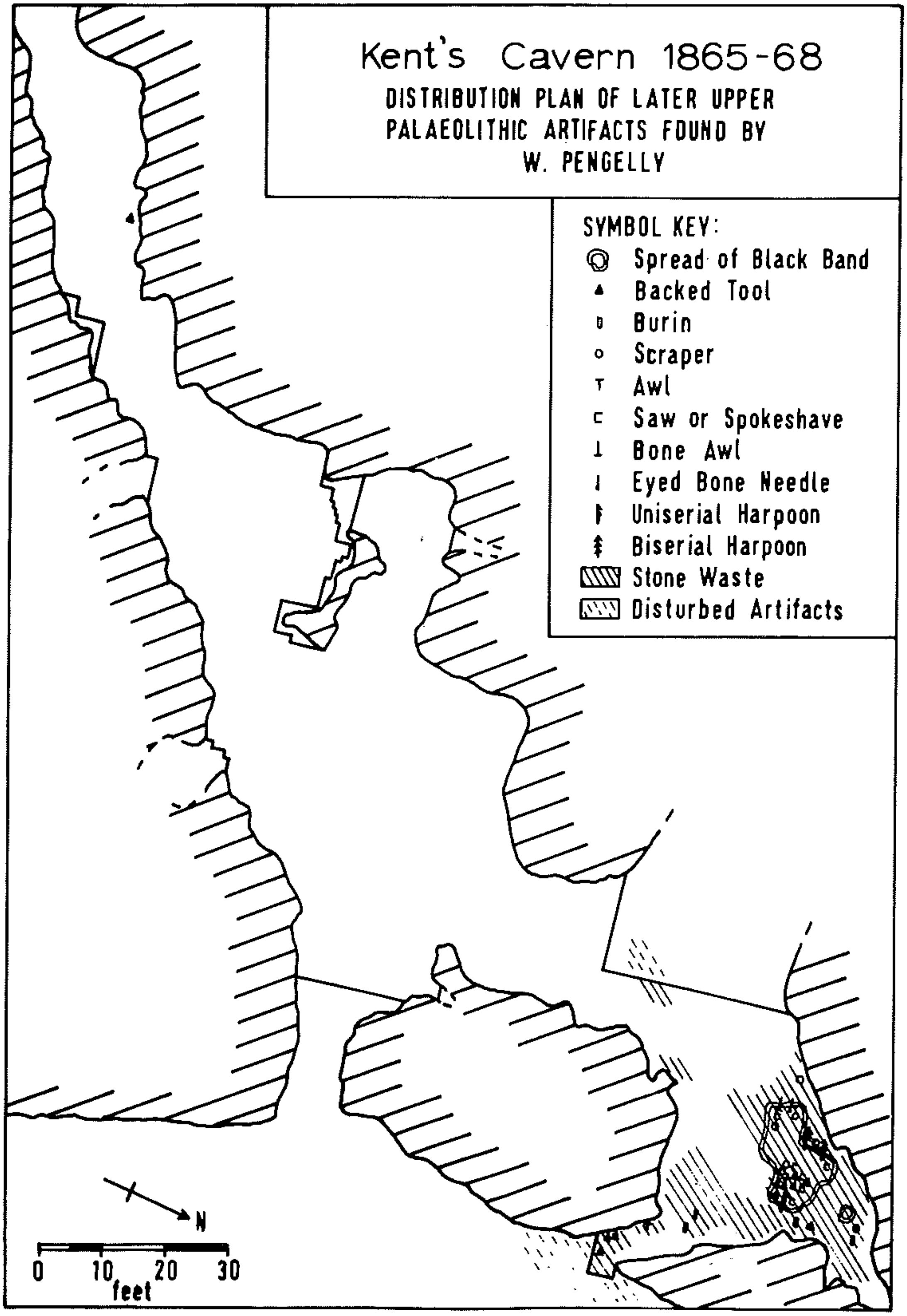


Fig. 9. Distribution of Later Upper Palaeolithic artifacts in the Vestibule.

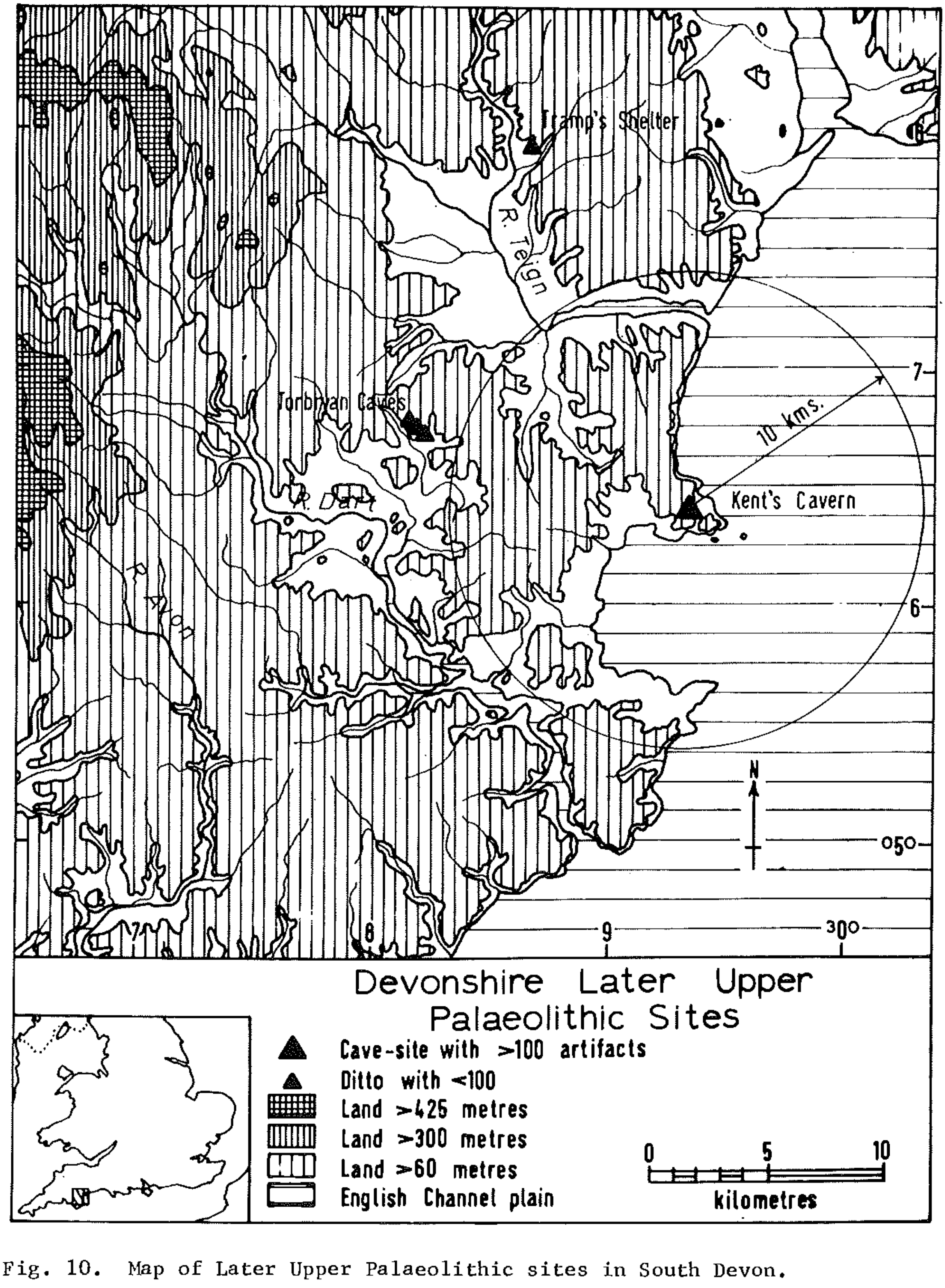


Fig. 10. Map of Later Upper Palaeolithic sites in South Devon.

diary suggests that these two concentrations may be chronologically distinct horizons, but this is not conclusive. Four out of five bone and antler tools are at the eastern end of the Black Band while the scrapers are distributed evenly through it. The burins are scattered to the east of the Black Band hearths. The possibility that this spatial clustering of types in and around the Black Band represents a series of separate activities around a central hearth cannot be ignored, but lack of a complete sample precludes any definite conclusions on this point. The fact that such spatial plotting is possible at all points to the remarkable ability of Pengelly as a pioneer excavator.

Significance of Kent's Cavern

The chief purpose of this paper has been to shift attention away from the historical aspects of Kent's Cavern towards an appraisal of its archaeological potential. Pengelly's remarkable excavating and recording techniques have permitted a relatively detailed reconstruction of the stratigraphy, vertical distribution and horizontal scatter of specimens within the deposits. Happily, these data reveal that the site is of considerable importance for the Palaeolithic sequence of Britain and that it may provide important information for some broader issues of prehistoric research. The site is certainly of more than local or historical interest.

Firstly, the Acheulian sample from the Bl Breccia is associated with at least three mammalian species which are known to occur in several European sites of late Villafranchian or Cromerian age. If this association can be confirmed by further excavation of the breccia, the site will provide the first really convincing evidence for the existence of the Acheulian complex outside Africa before the onset of the Mindel glaciation. The contents of the Bl Breccia also suggest a close association between artifacts and abundant cave bear remains. Only further investigation of the breccias and their mode of deposition will resolve the conflict of opinions about the validity of this association. If the artifacts and bear bones occur in a true archaeological context in the cavern and were not washed in from different sources by natural agencies, we may assume that specialized hunting activities took place in the cavern. A more detailed analysis of the cave bear bones should reveal whether or not hibernating bears were being butchered during the winter months. Such an interpretation would directly contradict the popular view of the Acheulians as unspecialized hunters.

Kent's Cavern also provides the largest Mousterian sample known from any site in Britain, and this is associated with abundant faunal remains. It is almost certain that the very deep Loamy Cave Earth contains more than one discrete Mousterian horizon. The site therefore provides the only known opportunity for examining the internal evolution, and possibly origin, of the Mousterian complex in Britain. Since undisturbed Loamy Cave Earth deposits are still present in the Great Chamber (Figs. 4, 6) further excavations should provide adequate artifactual material in direct association with pollen, granulometric, faunal and Carbon-14 dating information.

The earlier Upper Palaeolithic horizon has probably been completely removed so that further controlled excavations in this horizon are no longer possible. However, it is expected that a more detailed analysis of the fauna will clarify the dietary pattern of this group of hunters, and Carbon-14 dating of bone should allow us to determine the relationship between the British "Proto-Solutrean" and that of Southwestern France.

Future Research

Several lines of research have been proposed for future work at Kent's Cavern, as part of a wider program of investigations into the British Acheulian. The program will be conducted under the auspices of the Department of Anthropology, University of Oregon. There will be renewed excavations in the Great Chamber to recover further Mousterian and Acheulian material from undisturbed deposits. Extensive sampling for pollen and granulometric analyses will also be carried out to determine depositional processes and fluctuations in the local environment. The extant faunal collections are to be further analyzed, and both new and earlier excavated cultural materials will be published in detail, together with statistical comparisons of selected British and European Palaeolithic assemblages.

Addendum: Carbon - 14 dates

After this paper went to press, the following carbon - 14 dates were reported by Dr. W.G. Mook of the Natuurkundig Laboratorium der Rijks-Universiteit te Groningen, Netherlands:

Earlier Upper Palaeolithic: a sample of unburnt tibia of *Coelodonta antiquitatis* associated with a unifacial leaf-point etc. from the Great Chamber, GrN-6201 (bone collagen) 28,160 ± 435 years B.P. (K.C. 4)

Earlier Upper Palaeolithic: unburnt humerus of *Ursus arctos* associated with a bifacial leaf-point etc. from the Gallery. GrN-6202 (bone collagen) 28,720 ± 450 years B.P. (K.C. 5)

Later Upper Palaeolithic: unburnt tibia of *Ursus arctos* associated with a uniserial harpoon, various backed blades etc. in the "Black Band" hearth palimpsest from the Vestibule. GrN-6203 (bone collagen) 14,275 ± 120 years B.P. (K.C. 6)

Later Upper Palaeolithic: unburnt metatarsal of *Megaloceros giganteus* associated with a biserial harpoon etc. in the Vestibule. GrN-6204 (bone collagen) 12,180 ± 100 years B.P. (K.C. 7)

Acknowledgements

The authors wish to thank Professor C. Melvin Aikens for his time and patience in editing this paper. Printing was funded with the help of National Science Foundation Grant no: GS-28422X entitled Archaeology of the British Acheulian.

Appendix: Extant Artifacts from Disturbed or Inadequately Recorded Contexts

Artifact Type	Chert	Flint	
"Clacton" flake	-	1	
Cordiform/*bout coupe* handaxe	3	-	
Round scraper	-	1	
Side scraper	2	3	
End scraper on flake	-	4	
End scraper on blade	1	2	
End scraper fragments	-	3	
Awl	-	1	
Saw	2	8	
Concave scraper	1	4	
End scraper/saw	-	1	
Burin on snapped fragment	-	1	
Dihedral burin	-	1	
Unifacial leaf-point	-	3	
Nosed scraper	1	4	
Straight backed blade	1	-	
Creswell point	-	1	
Cheddar point	-	1	
Shouldered point/awl	-	1	
Blade core	-	1	
Core trimming flake	1	2	
Flake	4	13	
Blade	2	11	
Snapped blade/flake fragment	2	17	
Thermally fractured blade/flake	1	1	+ 1 Ivory
Bifacial chopper/core pebble	-	1	(?) rod
Total Stone Tools	21	85	

Table 9. Unprovenienced specimens from Pengelly's (1865-80) Cave Earth (B/A2) collection. Specimens in the Torquay, Bolton, British, and British (Natural History) museums.

Artifact Type	Trevelyan	MacEnery	Godwin-Austin	Ogilvie, et al.
Handaxe tranchet/flake	-	1	-	-
Point/saw	-	1	-	-
End scraper on blade	-	-	-	2
Awl	-	1	-	-
Saw	-	1	-	4
Concave scraper	-	-	-	3
Bone awl	-	1	-	-
Cheddar point	-	1	-	-
Shouldered point	-	1	-	-
Blade	1	3	2	7
Flake	-	-	-	52
Blade/flake fragment	1	1	-	61
Flake core	-	-	-	1
Blade core	-	1	-	-
Core trimming flake	-	-	-	9
Totals	2	14	2	139

Table 10. Unprovenienced specimens excavated by Trevelyan, MacEnery, Godwin-Austin, and Ogilvie, *et al*. Trevelyan (1824 and 1826) collection in the British Museum (Natural History). MacEnery (1825-26 and 1829) collections in the Torquay Museum, British Museum (Natural History), Oxford University Museum, Geological Society Museum. Godwin-Austin (1840) collections in the British Museum. Ogilvie, *et al*. (1926-40) collection in the Torquay Museum.

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