16. Preliminary Report of the 1985 Excavation Project (Jenkinson}.

During the 1977-88 projects the archaeological and palaeontological remains from Pin Hole Cave were totally re described. The cave was accurately mapped and planned for the first time and the surviving travertine deposits along each wall were recorded (see Jenkinson, 2020, b, 3.4and 13}. During the survey a number of undisturbed sediments were recorded (figure 1}. These included two masses of calcrete material adhering to the roof of the inner chamber and additionally a near complete section of infill was recorded in the rear of the cave. Although disturbed the section was adjacent to an area sampled by Simon Collcutt. (1977} and the terminus of the excavation of Leslie Armstrong (see plan Jenkinson, 2020, b, 2015.12.1}.

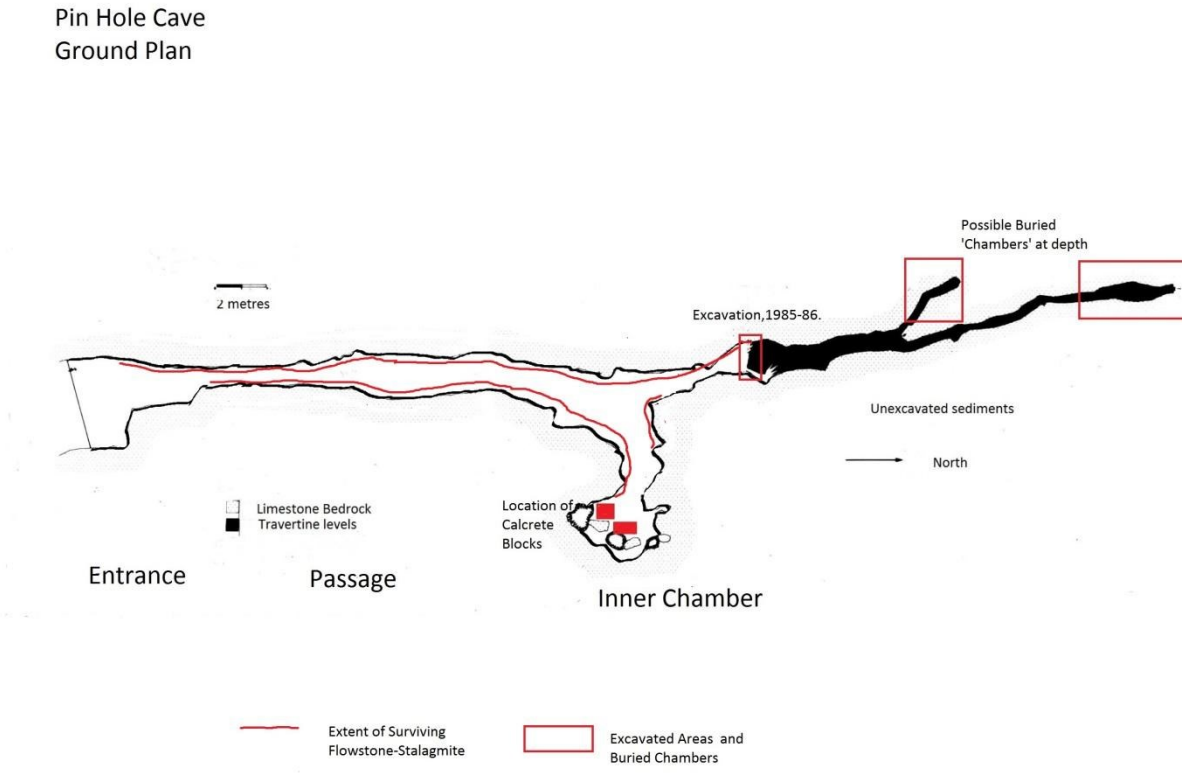

Figure 1, Pin Hole Cave Floor Plan.

Examination of the cave rear also revealed at least two locations where the cave probably expands in width below the current infill.

During the years prior to 1985 several small scale excavation were undertaken at the Dog Hole Fissure and Steetley Cave in which a series of micro-excavation techniques and specialist recovery techniques were developed. These were accompanied by new methods utilizing pollen, molluscan and sedimentary analysis. The diversity, richness and unusual nature of the Pin Hole sequence offered an opportunity to test these techniques on a complex sequence.

Examination of the cave rear also revealed at least two locations where the cave probably expands in width below the current infill. Examination of Armstrong's records and stratigraphic details on the finds themselves indicated that Armstrong used the stalagmite 'floor' formation as a datum for recording the depth of his finds. This was mapped and used to reconstruct a series of 30 cm depth spits for the area of excavation as a means of reconstruction the original contexts. This equated reasonable well with Armstrong's one foot depths and sections from the excavation (see Jenkinson, 2020, b, 13 figures 14 and 15}.

More recent excavations within both Creswell Crags and the Heritage area had clearly demonstrated the variation within infilling sediments and their contained vertebrate faunas could not only be extremely subtle but often contained features indicating post mortem and post depositional movement. This was particularly demonstrated at Steetley Cave and the Dog Hole Fissure, (Jenkinson and Gilbertson, 1984}. The realisation of micro variations at both these sites was considered when a programme of excavation was undertaken at Pin Hole. A key object was to examine part of the surviving rear section of sedimentary infill in order to directly correlate with Armstrong's work and the reconstructed 30 cm Stratigraphic Levels .Additionally, survey of the cave had shown the existence of travertine flowstone deposits suspended within the roof of the cave and also at a low level within the rear chamber.

Bearing these factors in mid a strategy for excavation proposed to sample

1. The rear section across the width of the cave and one metre northwards into the deposit. This would include the base of the sloping section of deposits.
2. Two calcrete blocks of sediment which were adhering the chamber
3. The clear/excavate the limestone wall constructed by Armstrong along the eastern passage wall. This was also used as an area to store some of his excavated material. The wall and sediment obscured the stalagmitic remnants adhering to the eastern wall.
4. There were a number of locations which contained stalagmitic sediments, 'in situ' which were selected for Uranium series estimations.

A trial excavation was undertaken upon a block of calcrete sediment from the inner chamber (Jenkinson 2020, b, 12.figure 68}.In addition to the opportunity to excavate a sample from the apparent highest deposit from the cave this provided an additional opportunity to refine the techniques of micro-excavation and recording.

Despite the overall richness of remains from the cave the surviving section was slightly to the north of the focus of animal and human use. It was also upon the edge of the substantial cone of sediment excavated by Armstrong within the ''Inner Chamber'' (Jenkinson, 2020, b, 13.figure7 and 13.figure 8,}.

Initial excavation was undertaken by the author, upon one of the calcrete block by Sally Hunt as part of a Masters study for the University of Sheffield. The block was removed from the cave for this purpose.

Subsequent excavation of the main cave section was achieved by a team assembled and funded as a Manpower Services Project, directed by the author. Two separate teams extending over a 2-3 year period were used. In each case an excavation team with supervisor (initially Ian Brooks and subsequently Ian Wall} performed the actual excavation and recording. Analysis and post

excavation tasks were achieved by a large dedicated team based at the temporary bases in Whitwell and the Creswell Centre. The processing centres were supervised initially by Chris Hunt (now Prof Chris Hunt} and the late Valerie Lowe.

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A significant motive for excavation and the micro techniques to be used was the hope that it would be possible to directly correlate with the work of Armstrong from the 'passage'' and ''inner chamber'' and particularly to correlate with the suggested interpretation and reconstruction of Stratigraphic Levels of artefactual and vertebrate bone distribution (Jenkinson, 1984, 2019}

Excavation Methods.

1. Calcrete Blocks

Three separate block of calcrete were removed from the inner chamber roof and two of these were excavated over a two year period 1983-85. (see Jenkinson, 2020, b, 12, figure 68, for location}.These were removed from the cave and excavated in temporary on site laboratories. In each case 10mm sample square areas, numbered from north to west, were excavated using 10mm depths. Each 10 x 10mm area within each spit was planned using a miniature grid (Jenkinson, 2020, b, 12, figure 67}.

Excavation was achieved using small brushes and small chisels in areas of calcrete. Over 100 hundred spits were recorded over the lateral extension of the irregularly shaped blocks.

Figure 2 Calcrete Block from the rear if Pin Hole, prepared for excavation. (Jenkinson, 2020, b, 12, figure 9

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In addition to the recording of in situ remains, including micro vertebrate bone, all sediment was dried, sieved and sorted by eye.

A total of 1450 individual vertebrate bones were recorded and these are individually described in CAPI -3 (Jenkinson, 2020, b, 3.figure 19}.

In addition to the recording of in situ remains, including micro vertebrate bone, all sediment was dried, sieved and sorted by eye.

2. Main Excavation.

In the cave rear large amount of surface disturbed sediment, resulting from Armstrong's excavation and disturbance by army personnel during world War 11, were removed (see Jenkinson, 2010.b.CAPI and Welbeck Estates, unpublished correspondence}.The disturbed sediments were present immediately at the base of the surviving section but also behind a limestone block wall constructed by Armstrong from clasts from his excavations. Many of the vertebrate remains, particularly the micro-vertebrates were marked with their original stratigraphic details, by Armstrong .These remains are now within the Creswell Trust collections and many are reported here for the first time. Following the removal of this 'spoil' a new surveyed ground plan was produced, with details of the previously buried stalagmite traces along the eastern cave wall (Creswell Trust Collections -but now lost} .Prior to production of this record of stalagmitic layers(Jenkinson,1984} it was not possible to locate Armstrong's dimensional records to the cave .The plan of the 'western' stalagmite formed the basis of reconstruction of Armstrong's work (Jenkinson,1984} .The contour of the stalagmite also appears to have been used for the reconstruction of the location of vertebrate bone used for radiometric dating (Jacobi,1988} The newly exposed stalagmitic layer was preserved on the eastern cave wall and occurred much lower down than the same formation on the western wall. This was previously recorded by Armstrong in a sketch (Jenkinson, 2020.b, 13, figure 14} but has never been accurately mapped or commented on .The clear demonstration of the gradient of deposits between western and eastern walls is of considerable importance for the interpretation of archaeological and palaeontological remains .This phenomenon may also explain the temporal discrepancy in some of the radiometric dating undertaking in the 1990s.

Within the newly cleared area of the cave rear, excavations were set up within the rear section. A platform, set on hydraulic rams was established adjacent to

the uppermost area of section (Jenkinson, 2012-, b, 12, figures 5-6 and 3}. Excavations were also established within a protruding mass of sediment within the lower area of section, (Jenkinson, 2020, b, 12, figure 3}

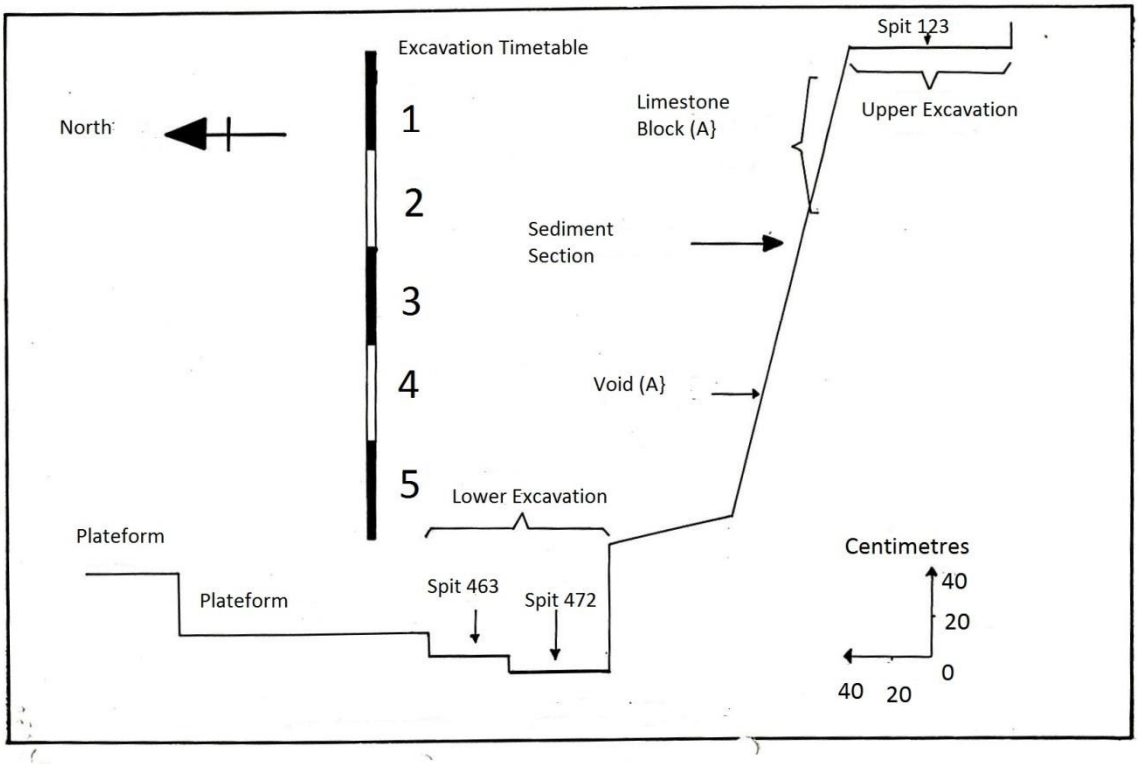

Figure 2. Cross section of the rear cave sediment section showing the areas of excavation during 1985. (See Jenkinson, 2020, b, 12, figures 1-2}

The style and methods of excavation upon the main surviving rear section were the same as those developed in 1983 on the calcrete blocks .The project

aimed to excavate an one metre deep area (from south to north} across the width of the cave which averaged a width of an average 1.5 metres and extended to a depth of approximately 3 metres (see Jenkinson, 12 figure 6-7}. The unusual location, above the current floor of the cave in a very constricted environment caused a number of purely technical difficulties which had to be resolved. Additionally the excavation team endured long hours on a high artificial platform in a cool and damp environment, Within a period of just over two years the upper excavated removed 180 one centimetre spits in 10x 10 samples over the1-1.6 metre width of the cave. With the lower area an approximate 50 spits were removed (see Jenkinson, 2020, b, 12, figure, 4}.

Excavated remains were recorded using conventional techniques but in this instance all observed remains were recorded within the context of a 10x10 centre area of 1 centimetre depth and within a geomorphic context (see Jenkinson,2020,b,12,figures ,41-43-44 and logs, figures 12,10-40}. Each observed object was annotated a find number (see Jenkinson, 2020, b, 12, figures 46-66}.

Figure, 3. Hand-drawn record of vertebrate bone remains excavated within a one centimetre spit within the upper excavation. (Jenkinson, 2020, b, 12, figures 46-66}

In addition to recording palaeontological remains samples were taken for sedimentary, pollen and paleo magnetic analysis.

Excavation of this difficult site with this degree of accuracy was unusual and as it transpired very time consuming for a semi-permanent specialist staff .A projected time scale for complete excavation was estimated at 5 years. Post excavation work occupied three Doctorate studies and a monumental task of vertebrate bone identification by the author.

Funding of the excavation and post excavation work was achieved with Manpower Services Commission projects and the assistance of the University of Sheffield and the local Authorities. Following two and a half years of excavation it was impossible to locate funds to complete excavation of the whole section .The available results, in this report, are therefore the result of excavation of approximately the upper third of the surviving section and approximately 10% of the lower section. This equates with the reconstructed Stratigraphic Levels, using Armstrong's work, (Jenkinson, 2020.b. 13 figure 13} of 1-5 and 10-12.In addition the removed and excavated calcrete ''blocks'' from the roof of the inner chamber equate with reconstructed Stratigraphic Levels 10-12. These are now known to be late glacial in age and occurred in the basal area of the west to east sediment gradient. As has already been mentioned this has severe implications for the interpretation of radiometric dates. Armstrong's dimensional records routinely record depth of occurrence but rarely lateral dimensions, meaning in effect that it is almost impossible to establish lateral position .In the lower areas of the cave sedimentary levels must have had older remains in the western area and younger ones in the east. Confirmation of this is available from a Mammoth tibia found at 11 feet below the stalagmite (by Armstrong} which has a stalagmitic concretion on the proximal end. This has been dated to the late glacial (see Jenkinson, 2020, b, 12, figure 69,}.

Analysis of the Vertebrate Fauna.-Calcrete ‘’Blocks’’.

Block PH185, removed from the ‘’Inner Chamber’’ was excavated by Sally Hunt who removed the indurated sediment in a series of 10x10 cms by 1 cm deep squares. A total of 1419 vertebrae bone fragment were recorded .These are listed in Capi.3,figure 19 and summarized in Jenkinson 2020.b,12, figure 70.The vertebrate bone fragments are dominated by micro-vertebrate post cranial remains making identification to species level difficult.

Larger mammals include a single antler tine of Reindeer (*Rangifer tarandus*} two indistinct cranial fragments which may be of the same species (*Cervid sp*} and two Bovid tooth fragments .Medium sized species include a single Red Fox (*Vulpes vulpes*} bone and several Hare bones (*Lepus sp*}.

With the exception of the Hare remains, the bone fragments are very few and occur in the restricted area of the inner chamber, well away from the apparent focus of animal activity. They are likely to be fragments that have moved down the sediment gradient into the lower chamber.

The largest component of the vertebrate population are rodents and particularly Field Vole and Bank Vole identified solely by cranial dentition. They are associated with a relatively large collection of post cranial remains many of which are complete or simply fractured. There is a single rodent phalange with a bit mark on the shaft. Despite the lack of species identification for the majority of the material the diversity of skeletal remains and their condition suggests that the species were resident.

In comparison to the vertebrate bone density of the adjacent sediment in the rear section of the cave the concentration is relatively sparse.

The excavated block and its undisturbed surrounding sediments adhere to the roof of the inner chamber. The block (s] have a coating of flowstone which extends from the upper surface of the main excavation of the rear section, along the eastern wall and down into the inner chamber. Within the chamber the flowstone coating covers the sediment block and adheres to the cave roof .The flowstone within the inner chamber has been dated using the Uranium/Thorium technique to 14.700.years BP (UEA.8403223.1 and UEA101}. The capping flowstone above the rear section excavation to 18,600 years BP

(UEA.100} (full discussion in Rowe et al 1989}.The age estimations suggest that the capping flowstone within this area of the cave is Late Glacial.

Direct stratigraphic correlation of the block with the reconstruction of Armstrong's excavation, nearby is difficult On the basis of the blocks depth from the main flowstone levels within the main chamber it probably relates to Stratigraphic Levels 6-8 in terms of Armstrong's excavation. It seems from Armstrong's comments that he may not have realised that his horizontal excavated layers cut latterly through deposits of different ages. This is particularly the case with sediments within and butting up to the entrance of the inner chamber (see figure 12.68}.

The preliminary results of analysis for vertebrates suggests that the micro-excavation techniques are appropriate for a site of this type. It is already clear that vertebrate population changes vary temporally within scales of centimetres within the cave. It is also clear that the distribution both temporally and laterally, within a 1m 1.5 m, area is extremely complex.

Full analysis, when completed should not only correlate with the sediments excavated by Armstrong, but may provide a much finer definition of temporal change within the rear of the cave. Unfortunately it may not be possible to correlate directly with human use of the cave which is concentrated in the passage slope, some 3 metre to the south of this excavation. Correlation with the lower levels excavated by Armstrong (levels 11-12 feet} is well established.

The excavation has been experimental and has occupied three years of continuous work with a rotating excavation team and a much larger post excavation organisation .Two thirds of the surviving section (the upper level and base} have been excavated before funding for the work was exhausted .Despite the disappointment of not fully excavating the rear section the post excavation analysis of vertebrates, sediments, pollen and palaeo-magnetic

studies should considerably contribute to our understanding of this very rich and diverse locality.

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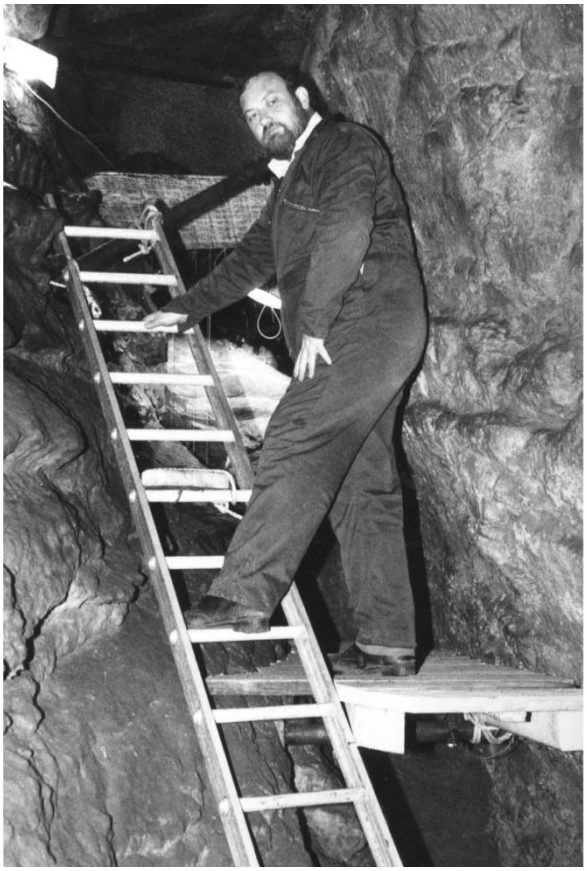

Figure 3 Hydraulic platforms adjacent to the rear section (Jenkinson, 2020, b, 12, figure 71}.

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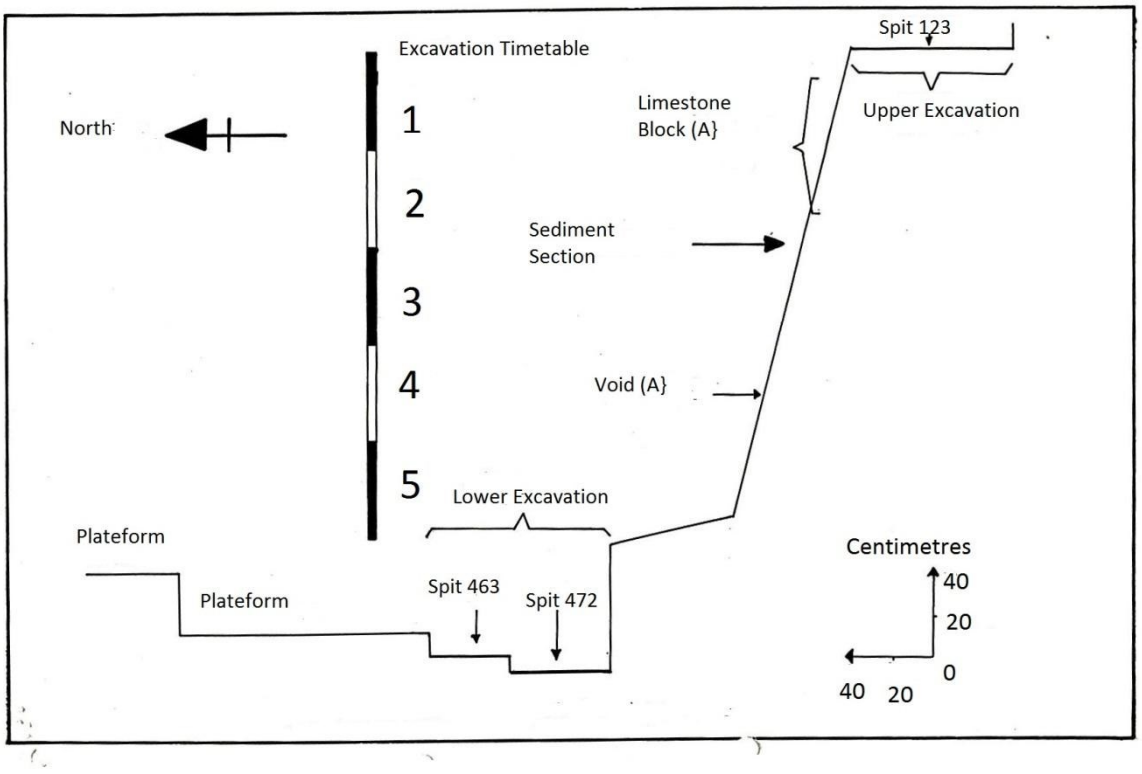

Figure 4. Cross section of the rear cave sediment section showing the areas of excavation during 1985. (See Jenkinson, 2020, b, 12, figures 1-2}

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Figure 5. Excavation and recording in progress, rear section. (Jenkinson, 2020, b, 112 figures 7}

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Figure 6 .Rear section excavation, recording micofaunal remains, three metatarsals of an unknown rodent. (Jenkinson, 2020, b, 12 figures 8}

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(UEA.100} (full discussion in Rowe et al 1989}.The age estimations suggest that the capping flowstone within this area of the cave is Late Glacial.

Direct stratigraphic correlation of the block with the reconstruction of Armstrong's excavation, nearby is difficult. The calcrete sediment which formed the upper half of this block can be traced across the chamber roof into the main cave section. From here it can be observed running upward along the wall toward the prominent stalagmitic layer that caps the rear sediment section This is particularly the case with sediments within and butting up to the entrance of the inner chamber (see figure Jenkinson, 2020, b, 12.figure68}.

Figures 4.12.72a and b.}

This suggests that the block sediment is contemporary with the two of the rear section and therefor the Stratigraphic Level 1-2 from Armstrong's excavation. This observation is of particular interest. The depth location of the Block is equivalent to Stratigraphic Level 11-12 of the reconstructed Armstrong excavation. In fact the sediment infill has a void along the eastern cave wall throughout most of the cave history and water has flowed off the surface of stalagmite which caps the rear section down the eastern wall and into the chamber. This may well explain the some of the problems with radiometric dates from this area, reported by Jacobi and which were Late Glacial in age. (Jacobi 1998}

Analysis of the excavation results in in preparation (Jenkinson, in prep}.This report has the main aim of describing the objectives for excavation, and the methods used. Analysis of the vertebrate fauna is initially complete and are reported in CAPI (Jenkinson 2020, b, CAPI, 3 figures, 19, 20 and 22}

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The complexity is clearly illustrated in figure 3 which shows the distribution of Microvertebrate bone within the 1 cm deep, spit 30, between the west (left hand side} and east cave walls.

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